MARCH 14, 1955

STEEL

THE WEEKLY MAGAZINE OF METALWORKING

No. 2 in 1955 Management Series

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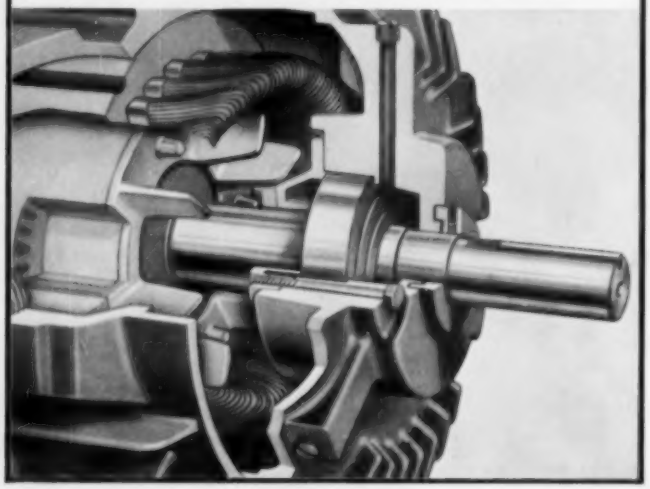
ALLIS-CHALMERS
Totally-Enclosed
Fan-Cooled
MOTORS

This Bearing, fully enclosed and protected, yet easy to grease when desired ...gives more value for your motor dollar

The bearing cap is held tightly in place against the inner face of the bearing enclosure. This cap, with its close running clearances, keeps grease from the interior of the motor . . . retains an ample supply within the bearing enclosure.

At the outer side of the bearing, double labyrinth seals keep grease in, also keep dirt out. What's more, large grease reservoirs act as additional dirt traps.



Lubricate without dismantling motor. Pipe-tapped holes in the bearing housings at two points provide both means for inserting new grease and a means of flushing out old grease.

Look for the extra bolts on the end housing... the sign of greater value. Ask your Allis-Chalmers representative or Authorized Distributor to show you a cutaway section of this maintenance-cutting design. Or write Allis-Chalmers, Milwaukee 1, Wisconsin, for Bulletin 51B7225.

ALLIS-CHALMERS

A-4575

The Man Behind the Mill

The bright streak in the picture is a glowing bar, speeding to the cooling beds of one of the country's premier bar mills—Bethlehem's 14-in. mill at the Johnstown, Pa., Plant.

Here at Johnstown we roll a full range of standard bars plus some of the most precise, most intricate bar shapes known to the trade. For example, the tire rim shown here in section.

Notice how hot-rolling puts extra metal where added strength is needed.

Another big advantage of Bethlehem Hot-Rolled Special Sections is *economy*. You'll find that it usually costs less to buy special sections, shaped to your requirements, than to put standard sections through expensive machining or fabricating operations.

Some of these special sections are extremely complex, but they're all in a day's work for this mill, and for the man behind the mill—the "Roller". Shown here on the job, the Roller is the operating chief in charge of the mill. Like all Bethlehem men in key positions, he has many years of experience; knows the mill inside out; knows exactly what it can do and what it can't do.

One of the Roller's responsibilities is to see that every finished bar has the proper size and shape. For that reason you can often find him at the delivery end of the mill, carefully checking bar samples with gauges, calipers or templates, making sure the bars are precisely to customers' specifications.

That same high standard of care, faithfully followed every step of the way, assures you of a mighty good product. So, when you're in the market for hot-rolled carbon bars in standard or special sections, try Bethlehem! Place your order with the Bethlehem sales office nearest you. And, meanwhile, if you'd like a free copy of our booklet, "Guide for Selection of Carbon Steel Bars," just drop a line to our Publications Department, at Bethlehem, Pa.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

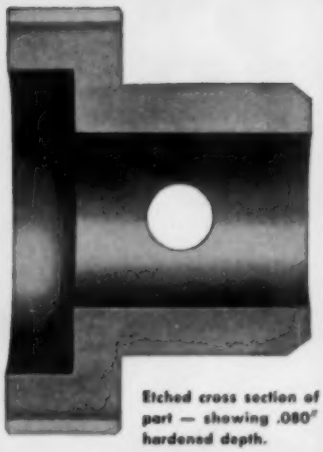
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM HOT-ROLLED CARBON BARS

STANDARD SECTIONS • SPECIAL SECTIONS • BAR SIZE SHAPES

BETHLEHEM STEEL

COSTS CUT 94%



Etched cross section of part — showing .080" hardened depth.

with TOCCO* Induction Heating

A cost reduction of 94% resulted when heat-treatment of this Corn Harvester part was changed from carburizing to TOCCO-hardening. Look at the unit cost breakdown:

CARBURIZING		TOCCO-*Hardening*	
Degrease	$0.0020	*eliminated*	
Carburize	0.0200	*eliminated*	
1st quench	0.0150	TOCCO, heat and quench	$0.0060
2nd quench	0.0150	*eliminated*	
Draw	0.0050	*eliminated (self-draw)*	
Shotblast	0.0035	*eliminated*	
Internal Grind	0.0243	*eliminated*	
External Grind	0.0166	*eliminated*	
	$0.1014		$0.0060

"—Savings of 9½ cents per piece—$4770.00 on each 50,000 piece batch, *plus* an hourly production increase from 120 to 300 pieces per hour, *plus* improved quality of the product by virtue of the deeper case and stronger core."

Have you investigated TOCCO's cost-savings possibilities for your hardening, brazing, melting or forging operations? Why not write us today or send blueprints of your parts—no obligation, of course.

THE OHIO CRANKSHAFT COMPANY

TOCCO

Mail Coupon Today

NEW **FREE** BULLETIN

THE OHIO CRANKSHAFT CO.
Dept. S-3, Cleveland 1, Ohio

Please send copy of "TOCCO Induction Heating."

Name_____

Position_____

Company_____

Address_____

City_____ Zone___ State_____

Fork truck with built-in lasso ... for cowboy drivers

● Over-enthusiastic truck jockeys can't hurt Baker Fork Trucks or loads carried (or themselves) by jumping from "low" to "high" or forward to reverse.

Baker drum-type controllers take motor speed in successive steps through acceleration stages, no matter how "heavy" the foot on the accelerator.

Jack-rabbit starts, with resulting motor burnouts, are impossible. Dynamic braking slows truck to a smooth stop, sparing driver and load, and acts as auxiliary brake on steep grades.

Motor strain or jolt from sudden direction changes is prevented by requiring truck to come to a virtual stop before reversing circuit applies.

All this adds up to safer operation for driver, truck and load, less down time, lower repair bills and longer truck life.

For more detailed information on Baker Fork Truck features, write for 4-color sketch book —Bulletin 64. The BAKER-RAULANG Company, 1259 West 80th Street, Cleveland 2, Ohio.

Baker.
industrial trucks

Quick Lever Reset

Saves Time— Speeds Work

Added Evidence that—

Everyone Can Count on VEEDER-ROOT

Where time consumed in resetting is at a premium . . . on short machine-runs, inspection, military equipment and other applications . . . this new time-tested Quick-Reset Ratchet Counter is exactly the time-saving device you need. Just depress the easy-acting lever on the right side through 45° . . . *all 4 figures reset instantly to zeros.* And a thumb-lever may be used on the left side also if the counter is to be operated manually.

This compact, standard counter, now readily available from stock, is one of scores of Veeder-Root Counters (both standard and special) for manual, mechanical and electrical operation in every field from electronics to atomics. Just name what you want to count . . . and "The Name that Counts" will help you do the job. Write:

VEEDER-ROOT INCORPORATED
HARTFORD 2, CONNECTICUT

Chicago 6, Ill. • New York 19, N. Y. • Greenville, S. C.
Montreal 2, Canada • Dundee, Scotland
Offices and Agents in Principal Cities

"The Name that Counts"

This Week in Metalworking

STEEL
THE WEEKLY MAGAZINE OF METALWORKING

Vol. 136 No. 11 March 14, 1955

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Editorial, Business Staffs—16. Advertising Index—165. Editorial Index available semi-annually. STEEL is also indexed by Engineering Index Inc., 29 West 39th St., New York 18.

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SEYMOUR
MAKES
Top Quality Brass
in Quantity

Seymour has long been famous as a producer of precision quality Brass suitable for select users.

Now Seymour offers the same top quality brass in a wider range of sizes and tolerances to ALL industry.

With new, modern production facilities, Seymour is now prepared to fill QUANTITY ORDERS of top quality brass in sheet, strip and wire form.

Remember . . .
"You can save more with Seymour's top quality brass".

Seymour also makes . . .
NICKEL SILVER • PHOSPHOR BRONZE • WELDING RODS • NICKEL ANODES • BRIGHT NICKEL for Plating.

THE SEYMOUR MFG. CO.
SEYMOUR, CONN.

WHEN IT'S
***Special* BOLTS**
***and* STUDS**

Send your Specifications to

ERIE

40 years' experience in making special bolts, studs, nuts for specific job requirements.

REPRESENTATION IN PRINCIPAL CITIES

behind the scenes

Creed For Cost Cutting

When Assistant Managing Editor John Morgan began investigating a STEEL Program for Management story on cost-cutting he started by dabbling in a pool of literature devoted to the subject. The pool resolved itself into an ocean: In the Cleveland Public Library alone there were more than 500 books dedicated to the proposition that without sensible cost-cutting, commercial enterprise should drop dead, period. As John ploughed through books, arranged interviews, made phone calls and roughed his story into shape he sensed the limitations of space allotted to him. He felt like a man required to outline a history of mathematics in two paragraphs. (Come to think of it, somebody once wrote a one-sentence review of "Anthony Adverse"; it was, as we recall, "Young man travels around a lot and kills himself with an axe.")

There was so much to write about, John finally contented himself by consolidating the philosophy of cost-cutting and wrapping it up in an article we think you will appreciate. An additional difficulty popped up over the title of the article. At staff meetings dozens of suggestions bloomed and died. To our way of thinking one of the most descriptive titles came from Copy Editor Harry Chandler, a refugee from southern Indiana who is now growing accustomed to wearing shoes. We fished his discarded title suggestion from the waste basket and used it as a head for this item. The proper title appears on the cover.

Grousing Gutenbergs

To our far from business-like mind the great question of GAW (Guaranteed Annual Wage) poses problems beyond our understanding. We have read much that is available on the subject, including the excellent presentation in the March 7 STEEL, but we don't feel qualified to debate the issue. All we know for sure is that employees produce more when they are well treated. But how far should an employer go to indulge his help? Is there a line somewhere? Is the GAW just one gimmick? A delicate problem in labor relations occurred right here in our own camp a few days ago; nobody in authority knows about it, and therefore nothing has been done to remedy the situation.

Readers of this (you will pardon the expression) column may recall that when Heinz von Koschembahr, the indomitable proofreader, ascended from the 2nd to the 9th floor to ride herd on STEEL proofs, the editors grew increasingly wary. Today they even hesitate to write ordinary little words like "cat" or "telangiectasis" without first checking the dictionary. So now Heinz sometimes acts as liaison between the editorial and composition rooms.

We now flash the camera to the composing room. Compositors George Gouch and Hank Epp glumly approach Shrdlu with a problem in labor relations.

"Look," says George, "it gets lonesome down here, with nobody to look at except other printers. So usually, when the boys upstairs want to make some ordinary changes, they send down instructions with Barbara Davis, or Mary Ann Stuve. We like that. It's real pleasant to look up from the stone and see something nice wrapped in a girdle instead of an Arrow shirt."

"Yeah," says Hank. "Or in a printer's apron. But now they're giving us the business. What happened to us shouldn't happen to a Communist. Tell him what they did to us, George."

"We had some type left over," George explained. "So we had to know what to do with it. We call up—naturally expecting Barbara or Mary Ann. So who comes down with the corrections? von Koschembahr!"

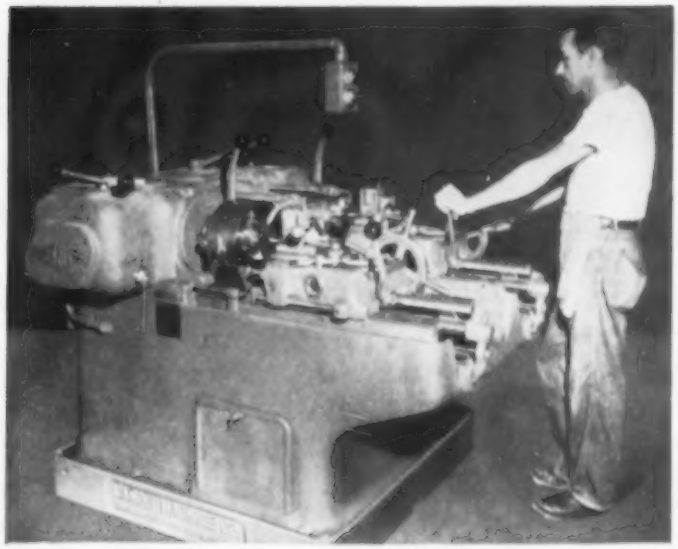
Sheepish Word

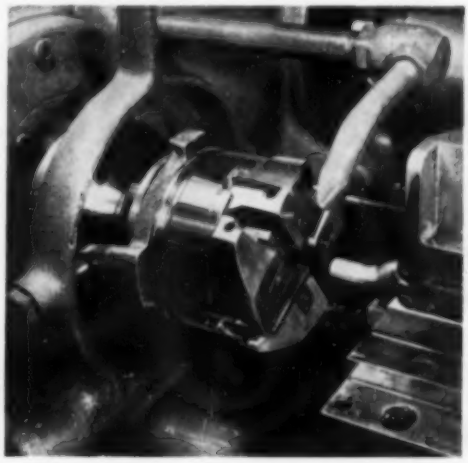
Printers aren't the only unhappy men around the place these days. Associate Editor Van Caldwell is upset because he is afraid somebody will look up the word "bellwether" which is so frequently employed in STEEL to mean a leader, or new departure, or a weathervane. "It really means an altered ram," Van whispers, "and a Judas, to boot!"

Shrdlu

(Metalworking Outlook—Page 57)

FASTER TURNING Using CUTTING TOOLS Simultaneously





BY turning, facing, and chamfering on Landis Threading Machines, automotive parts production at Thompson Products in Detroit has been substantially increased. This LANDIS **Hollow Milling** technique makes large out-put increases possible by applying a number of simultaneously-functioning cutters, thus multiplying the feed rate of a single tool.

The illustrations show one of these parts, steering links, being turned and faced on a LANDMACO Double-Spindle Leadscrew Threading Machine. SAE 1040 steel forgings are turned (1/32" stock removal) 1⅛" in length and faced by four special turning cutters in ⅞" V LANCO Hardened and Ground Heads. Production regularly averages 200 pieces per hour, with the ⅝" turned diameter held within ±.004". Four hours production is obtained between cutter grinds.

This LANDIS technique offers important advantages over other methods of turning, forming, and facing. The use of four or six simultaneously-functioning cutters, in addition to increasing production, reduces tool cost and workpiece spoilage to the minimum. The diametrically-opposing cutters evenly distribute cutting strains and maintain proper work alignment. LANDIS Cutters, available in a wide variety of styles, are economical for they are usable for most of their length with only a simple regrinding of the rake angle.

LANDIS Machine COMPANY
WAYNESBORO
PENNA., U.S.A.

Additional information will be sent on request—please include specifications when writing.

LANDIS

THE WORLD'S LARGEST MANUFACTURERS OF THREADING EQUIPMENT - CUTTING - TAPPING - GRINDING - ROLLING

Now...modernize your grinding operations without draining away your capital!

Take advantage of the Norton Grinding Machine Lease Program

for low-cost leasing of new Norton grinders and lappers

Naturally, you want to meet competition on at least equal terms — with the latest and best in modern grinding equipment.

Yet, like so many other manufacturers, you may want to conserve your working capital — and so the cost of replacing inefficient producers is delaying, if not prohibiting, your modernization.

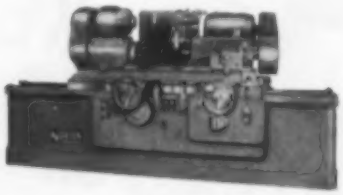
What's the answer?

The answer is the Norton Grinding Machine Lease Program, developed to help manufacturers secure the grinders and lappers they need for modernization — without weakening their financial position.

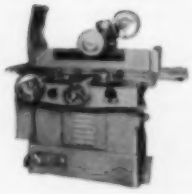
The new Norton Program gives you three separate plans for leasing new Norton grinders and lappers, with payments extending over a seven-year period. Each plan meets specific requirements. Each plan is extremely flexible, providing for early termination of the lease, or purchase of the equipment, at your option.

One of these plans may help pave the way to better business for you. Don't miss getting complete facts on them — send in the coupon!

This folder tells you how you can pay for Norton machines while they're building your profits!

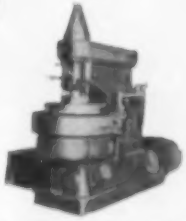


10 x 36" Type CTU Semiautomatic Cylindrical Grinder

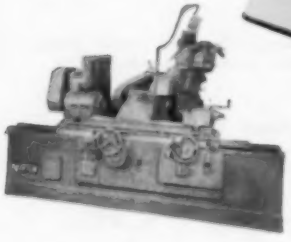


8" Hydraulic Surface Grinder

No. 20 Cutter and Tool Grinder



No. 26 HYPROLAP® Lapping Machine



Type CV-4 Semiautomatic Angular Wheelslide Grinder

12" Universal Grinder

Under the Norton Grinding Machine Lease Program the machines illustrated here—and many more — are now available to you, under low-cost, flexible leasing arrangements.

This folder describes the Program giving details of the three different plans by which you can improve your competitive position and profits. Send for it now — and remember: only Norton brings you such long experience in both grinding machines and grinding wheels to help you produce more at lower cost.

To Economize, Modernize With NEW

NORTON

GRINDERS and LAPPERS

Making better products . . . to make your products better

District Sales Offices: Worcester • Hartford
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*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

NORTON COMPANY, *Machine Division*
Worcester 6, Mass.

D

Please send me your folder on the Norton Grinding Machine Lease Program.

Name .....

Title .....

Company .....

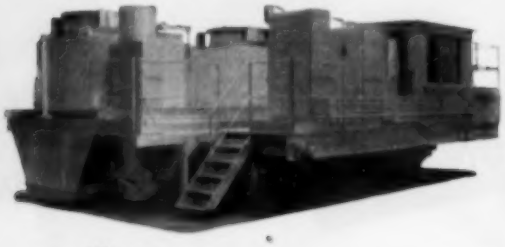
Address .....

City ..... *Zone* .... *State* .....

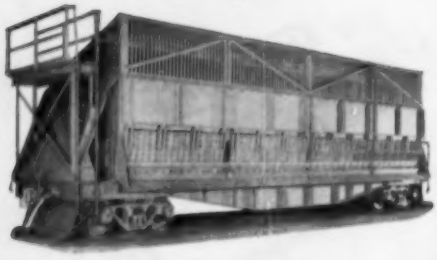
COAL TO COKE VIA ATLAS CARS

Making coke is a specialized business, and requires special equipment like the cars below. Coke plant operators prefer Atlas Cars because they are dependable.

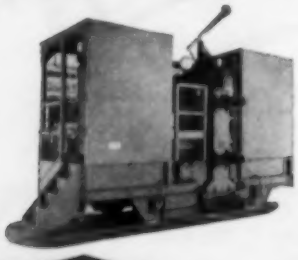
3 HOPPER COAL CHARGING CAR



COKE QUENCHER



HYDRAULIC DOOR MACHINE



40-TON COKE TRANSFER CAR

THE ATLAS CAR & MFG. CO.

ENGINEERS MANUFACTURERS

1140 IVANHOE RD. CLEVELAND 10, OHIO, U. S. A.

LETTERS
TO THE EDITORS

Shields for Welds

Your article, "CO_2 Means Cheaper Gas-Shielded Welds" (Jan. 31, p. 68), was most interesting and informative.

I would appreciate the name of the firm referred to in the pictures.

Gerald S. Ellsworth
National Electric Welding Machines Co.
Bay City, Mich

• *It's Air Reduction Sales Co., 60 E. 42nd St., New York, N. Y.—ED.*

It has occurred to me that a product much cheaper than carbon dioxide would be a so-called "inert gas" made by an inert gas generator. We can make such a gas from natural gas at a price range of 7 to 15 cents per thousand cubic feet, depending on the cost of raw materials and the type of gas desired. We can make such an atmosphere which will be entirely reducing, one which will be inert, or one which will be equivalent of carbon dioxide.

I would like to place some of our information in the hands of the people who are heading this research, as it might be of mutual advantage.

W. A. Darrah
president
Continental Industrial Engineers Inc.
Chicago

• *Your suggestion has been passed along to the proper contacts.—ED.*

Crow About Your Product

Would you please send me two tear sheets of the article, "Product Communication Paves the Way for Greater Sales," which appeared on p. 73 of the Feb. 14 issue. (Product communication does its job by paving the way for your salesmen . . .)

H. E. Snyder
Arcos Corp.
Philadelphia

I would like three copies . . .

M. E. Becker
Aircraft Division
Fafnir Bearing Co.
New Britain, Conn.

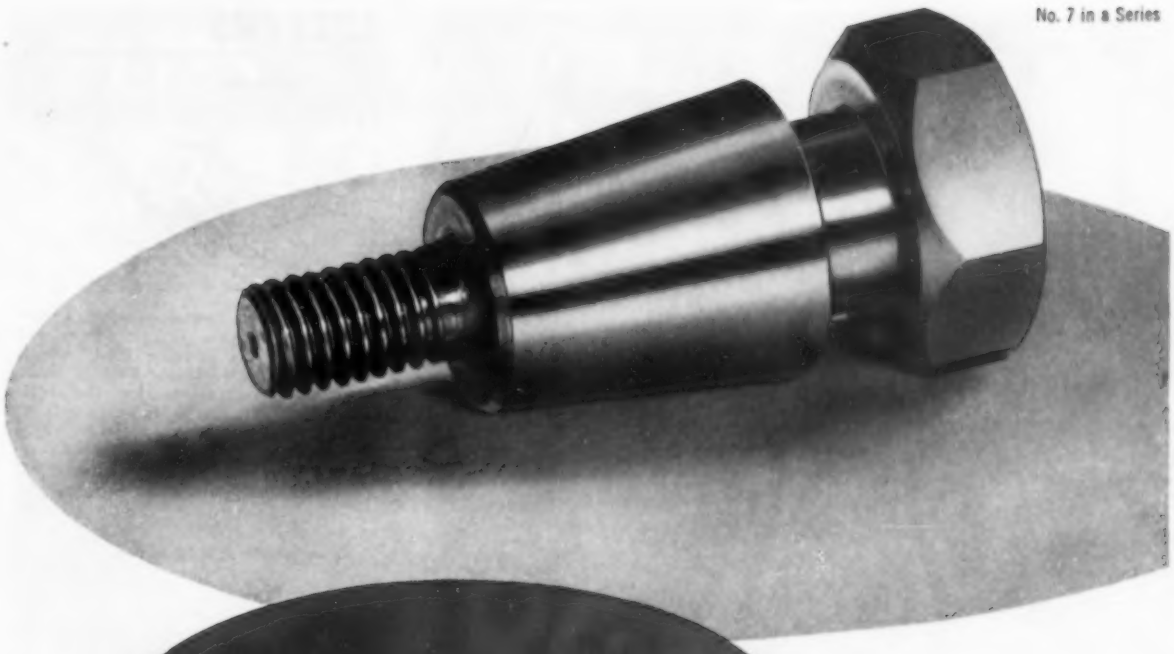
We would like two reprints . . .

H. E. White
president
Cleveland Hardware & Forging Co.
Cleveland

• *Sent.—ED.*

(Please turn to page 12)

No. 7 in a Series



carbide service available

data for comparison

Part	Petcock Center
Machine	1⅛" Six Conomatic
Tools	100% Carbide Tipped
Material	X-1112
Stock Size	1" Hexagon
R. P. M.	1562
Time	8 seconds

Where conditions are favorable, 100% carbide tool-ups on "Automatics" make HSS tools appear as obsolete as ancient tools of carbon steel.

In determining the "favorable" conditions, the Conomatic Carbide Development is of real service to the "Automatic" user. Without risk of production loss or obligation of machine purchase, he gets an eye-witness demonstration of the profit possibilities of 100% carbide tooling to his own work.

Conomatic } CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.

...tailored to fit your needs

There's no load too large or too small for Yellow Strand Braided Safety Slings. These patented, lighter-weight, easily managed slings have safely handled loads up to 350 tons . . . loads that were odd-shaped, slippery, highly-polished, fragile or just ordinary lifts.

Whatever you have to lift . . . whatever type of sling you require, a Yellow Strand Braided Safety Sling can be engineered exactly for the task.

BRODERICK & BASCOM ROPE CO.
4203 Union Blvd. • St. Louis 15, Mo.

AMERICAN HANDLING EQUIPMENT

With American Logging Tool Corp. now a wholly-owned subsidiary of Broderick & Bascom Rope Co., your B & B distributor can supply your needs in high-quality load binders, car movers, car door rollers, chain hooks, swivels and logging tools. Call or write for information on this new product line for industry and loggers.

SPECIFY Yellow Strand® SAFETY SLINGS

LETTERS

(Concluded from page 10)

Powder Gears Get Tough Jobs

We would appreciate receiving two tear sheets of the article, "Powdered Metal Gears for Tougher Jobs," which appeared on p. 84 of the Feb. 14 issue. (Potential applications for the high strength powder parts are gears, rollers, pawls, bushings, cams and other structural shapes . . .)

John R. Powers
general manager
Supermet Division
Globe Industries Inc.
Dayton, O.

Please send me a tear sheet . . .

T. R. Weins
assistant chief metallurgist
Beloit Works
Fairbanks, Morse & Co.
Beloit, Wis.

Please send a tear sheet . . .

George Quint
Scudder, Stevens & Clark
New York

Lighter Burdens

In your Jan. 23 issue's "Metalworking Outlook" (p. 32), it was announced that "The first mass-produced consumer product to be made of magnesium will be luggage. Dow Chemical Co. and Shwayder Brothers are co-operating to produce Shwayder's Samsonite in the metal . . ."

Would you please tell us where we may contact Shwayder Brothers?

W. H. Mead
Vacu-Blast Co. Inc.
Belmont, Calif.

• *The address is Shwayder Bros., 1050 S. Broadway, Denver, Colo.—ED.*

Directions to Directive

In your article, "U. S. To Refurbish Its Own Tools" (Feb. 7, p. 72), you refer to Defense department Directive No. 4215.1. That directive prescribes "policies and procedures for the acquisition, retention and maintenance of production equipment and accessories." We have been unable to locate that directive in any of the published services we receive from Washington. Can you tell us where we can obtain a copy of it?

E. T. Nielsen Jr.
Ordnance Division
Food Machinery & Chemical Corp.
San Jose, Calif.

• *Write T. P. Pike, assistant secretary of defense (supply & logistics), Pentagon, Washington 25, D. C.—ED.*

Message for Management

We would like to get 20 copies of your article, "Strengthen Your Management Team for the Competitive Years Ahead," (Jan. 3, p. 99).

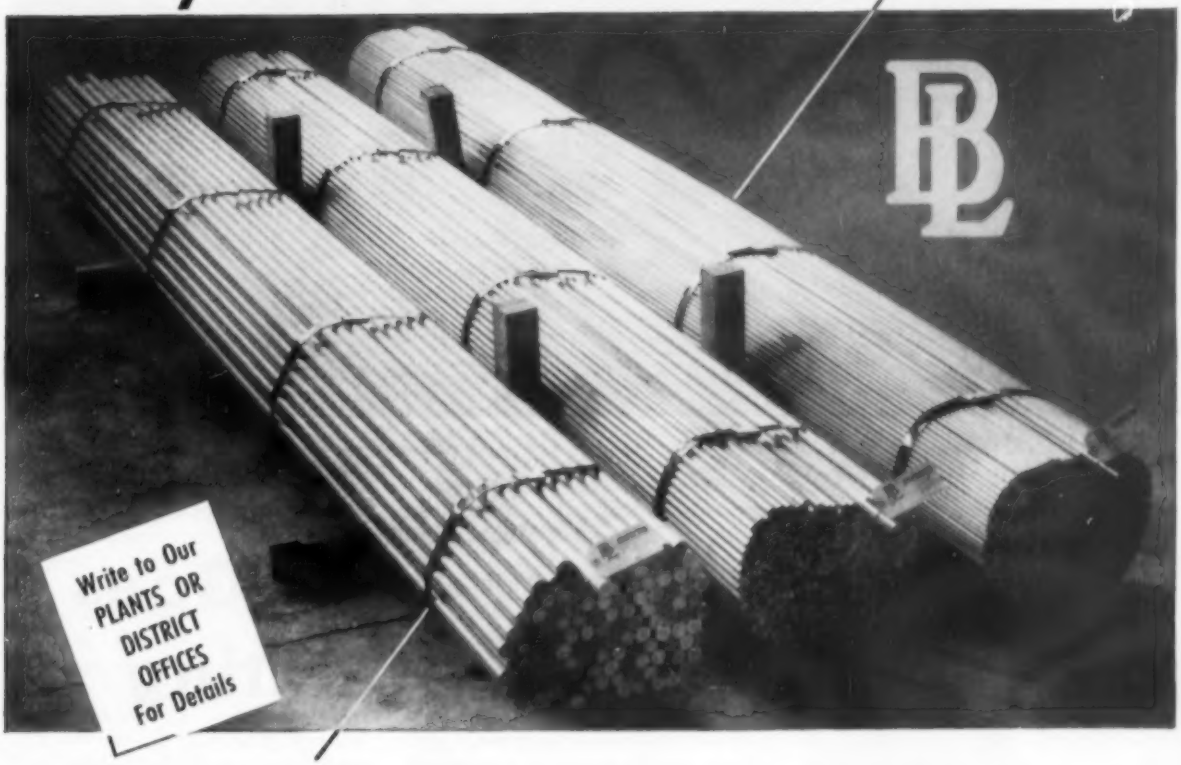
Pat Taylor
Manufacturing Division
Fairbanks, Morse & Co.
Chicago

• *Sent.—ED.*

BLISS & LAUGHLIN'S

New Look and New Standard

for COLD DRAWN BAR FINISHES



*LUSTERIZED

TRADE-MARK

COLD DRAWN FINISH

Cold Finished Carbon and Alloy Steel Bars

*LUSTERIZED PROCESS Pat. Applied For

Buy it . . . Compare it!

BLISS & LAUGHLIN, INC.

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1. Steel Sheet, smeared with die lubricant, is fed into the jaws of a powerful press that will deep draw it to the contour of a refrigerator door.

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Where Steel Goes Home-Hunting

Have you ever watched a woman select a refrigerator? She'll stand off and admire it, consider its capacity and color, check the conveniences it offers, examine its finish and compare it with others for styling and price. She wants the best looking, handiest, and most solidly constructed model she can fit into her kitchen and budget.

To give her what she wants takes better than ordinary steel. In today's competition, appliance manufacturers are insisting more than ever before on higher quality cold rolled steel sheets to meet high-speed production line requirements for producing the best looking appliances at lowest cost.

Many sheet steel users are specifying sheet steel from Pittsburgh Steel Company, where new equipment and the latest developments in electronic control are coupled with a half-century of know-how to produce exactly what is needed to meet these high-speed production line requirements.

• **What It Takes**—If you wonder why the quality of steel is so important, consider the appliance maker's problems for a moment.

The door panel for a refrigerator, for example, arrives at his plant as steel sheet. Fed into an 800-ton two-stroke ram press on one of his press lines, the sheet is deep drawn. Actu-

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3. Steel Cabinets to encase the refrigerator are assembled and finished with careful precision for show-room appeal.

4. Glistening Coats of durable finishes in many colors are applied to the steel so that it will blend in with the dream kitchen.

ally the steel flows under tremendous pressure to make the strong, smoothly contoured door panel.

Each sheet must flow evenly to provide a complete door that has no surface imperfections such as grainy areas, seams, buckles, wrinkles, stretcher strains, or skin breaks and as this press can make eight door panels a minute, the steel must be absolutely uniform from sheet to sheet.

To provide uniformity, the steel's chemical composition cannot vary more than a few hundredths of one per cent. It must be clean and its grain structure must be controlled with microscopic accuracy. The finished cold rolled sheet cannot vary more than a few thousandths of an inch in thickness and must meet other close dimensional tolerances.

Whether it's a door panel, an outer cabinet, a compressor shell, or any of more than a dozen special steel parts in a refrigerator, the story is always the same. The steel must have special inherent qualities to meet specific production line requirements and then go home-hunting.

• **How It Pays**—From modernized blast furnaces through to the newest sheet mills in the industry at Pittsburgh Steel, the making of steel is geared to meet the manufacturers' precise needs with the best that long experience and modern technology can produce.

If you use hot or cold rolled sheet steel in your operations, why not take advantage of the opportunities Pittsburgh can offer you in increased yield, longer die life, faster production, and better quality products. A phone call today to the office nearest you will bring prompt personal service.

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Steel gets a two-way stretch

In forming the compressor shell for a refrigerator, disks of steel, 13⅜ inches in diameter, are blanked from hot rolled drawing quality sheet (right). The blank feeds into a 200-ton double acting press (in background) where the first stroke draws it into a cup 3½ inches deep. The next stroke turns the cup inside out, drawing it to a finished depth of 6½ inches with a diameter of 6⅞ inches.

After forming, the shell is trimmed, pierced and has fittings brazed into it. All parts must fit snugly, containing pressure without gaskets, to provide the heart-beat of the refrigerator as refrigerant is circulated. This ultra-modern, automatic equipment can produce up to 7,000 compressor shells daily.

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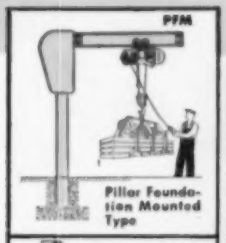

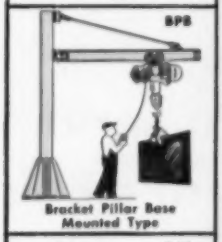

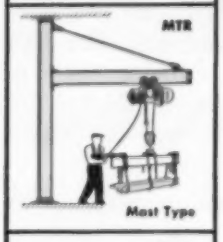

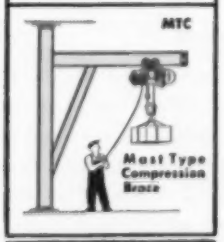

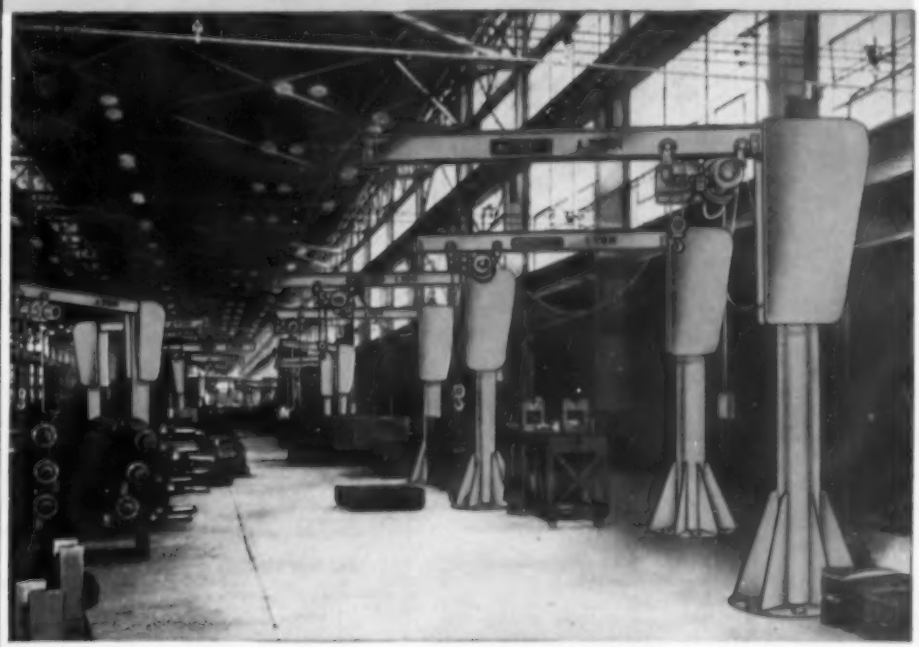

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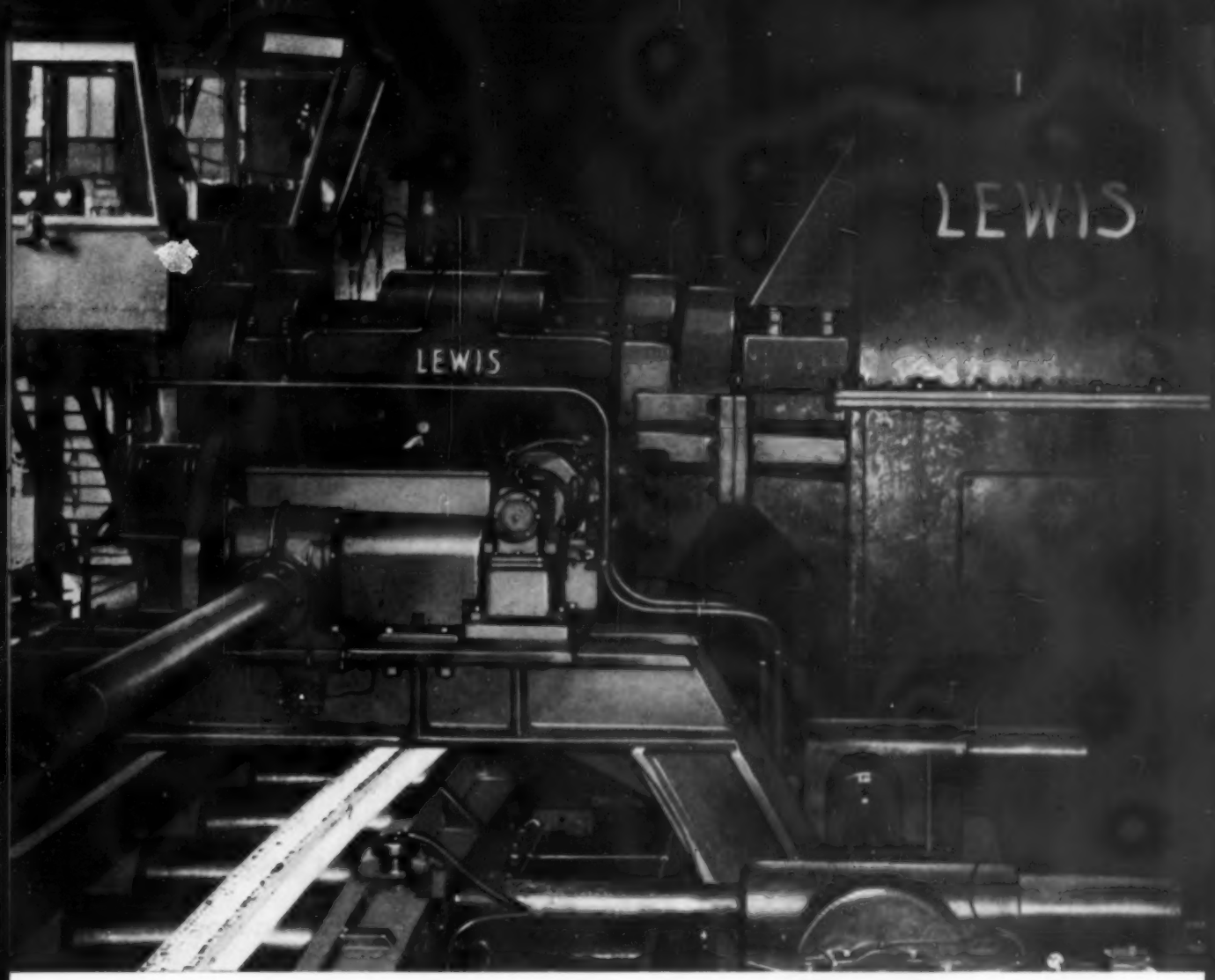

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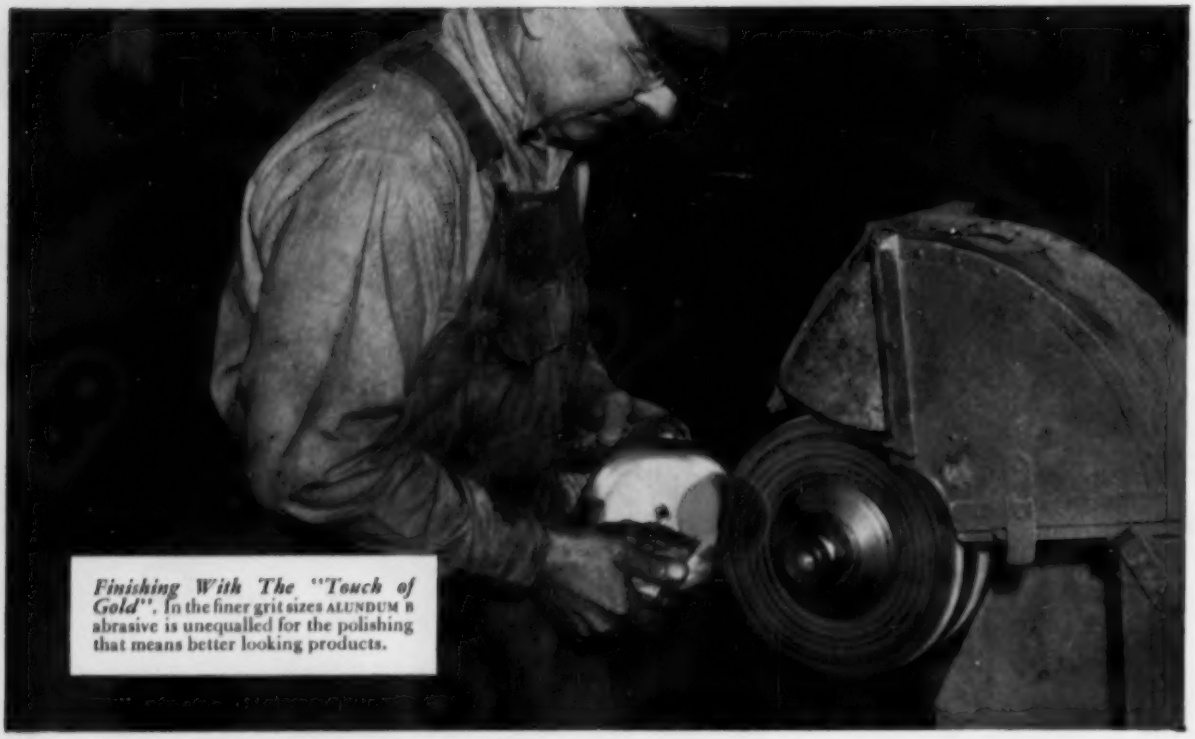

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- ***Usable with cement or glue,*** it is equally firm-clinging and efficient with either.
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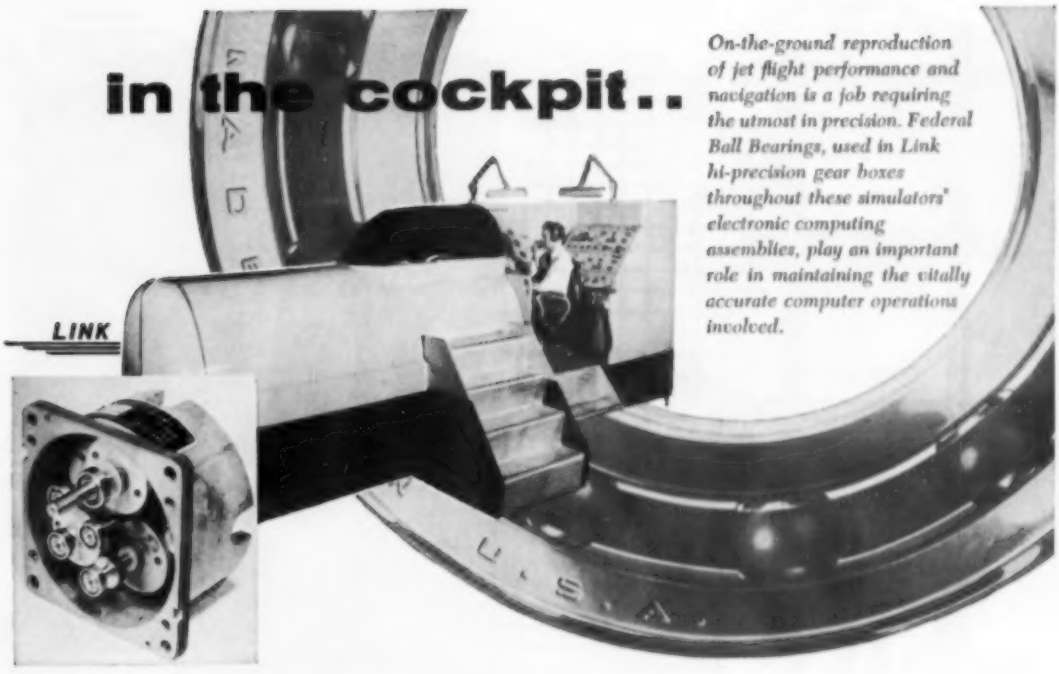

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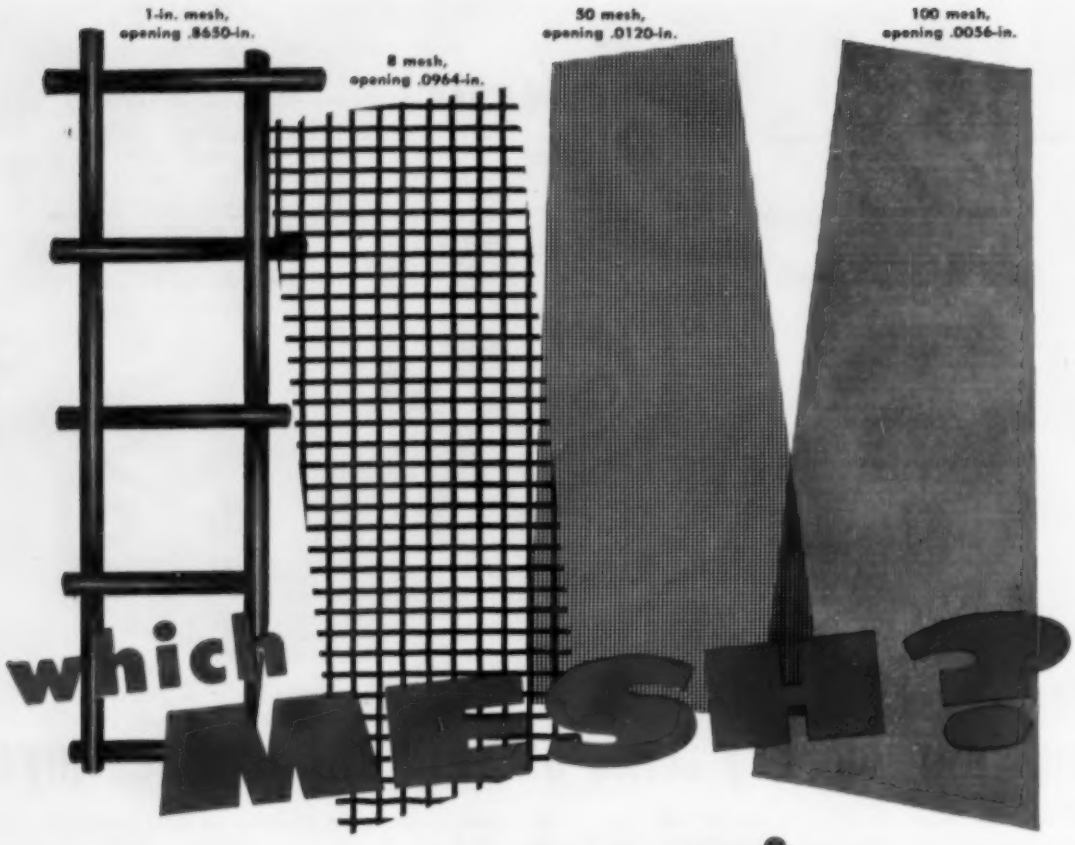

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OF MEETINGS

March 14-16, Society of Automotive Engineers Inc.: Production meeting and forum, Netherland Plaza hotel, Cincinnati. Society address: 29 W. 39th St., New York 18. Secretary: John A. C. Warner.

March 14-18, American Society of Tool Engineers: Western industrial exposition, Ambassador hotel and Shrine Auditorium, Los Angeles. Society address: 10700 Puritan Ave., Detroit 21. Executive secretary: Harry E. Conrad.

March 15-16, Steel Founders' Society of America: Annual meeting, Drake hotel, Chicago. Society address: 920 Midland Bldg., Cleveland 15. Secretary: George K. Dreher.

March 15-17, American Institute of Electrical Engineers: National conference on electrical utilization of aluminum, William Penn hotel, Pittsburgh. Institute address: 33 W. 39th St., New York 18. Secretary: N. S. Hibshman.

March 16-18, Pressed Metal Institute: Annual meeting and exhibit, Carter hotel, Cleveland. Institute address: 2860 E. 130th St., Cleveland. Managing director: Orrin B. Werntz.

March 16-19, Industrial Diamond Association of America: Annual meeting, Hollywood Beach hotel, Hollywood Beach, Fla. Association address: 124 E. 40th St., New York. Secretary: Athos D. Leveridge.

March 20-23, National Association of Waste Material Dealers Inc.: Annual meeting, Conrad Hilton hotel, Chicago. Association address: 271 Madison Ave., New York. Secretary: Clinton M. White.

March 21-23, Association of Iron & Steel Engineers: Western meeting, St. Francis hotel, San Francisco. Association address: 1010 Empire Bldg., Pittsburgh 22. Managing director: T. J. Ess.

March 22-24, International Acetylene Association: Annual meeting, Shamrock hotel, Houston. Association address: 30 E. 42nd St., New York 17. Secretary: H. F. Reinhard.

March 23-24, American Society of Mechanical Engineers: Annual engineering management conference, Statler hotel, Cleveland. Society address: 29 W. 39th St., New York 18. Secretary: C. E. Davies.

March 24-25, American Hot Dip Galvanizers Association Inc.: Annual meeting, Brown hotel, Louisville. Association address: 1506 First National Bank Bldg., Pittsburgh 22. Secretary: Stuart J. Swensson.

March 24-25, American Machine Tool Distributors Association: Spring meeting, The Greenbrier, White Sulphur Springs, W. Va. Association address: 1900 Arch St., Philadelphia 3. Secretary: Thomas A. Fernley Jr.

March 28-29, American Institute of Electric Engineers: Materials handling conference, Hotel Cleveland, Cleveland. Institute address: 33 W. 39th St., New York 18. Secretary: N. S. Hibshman.

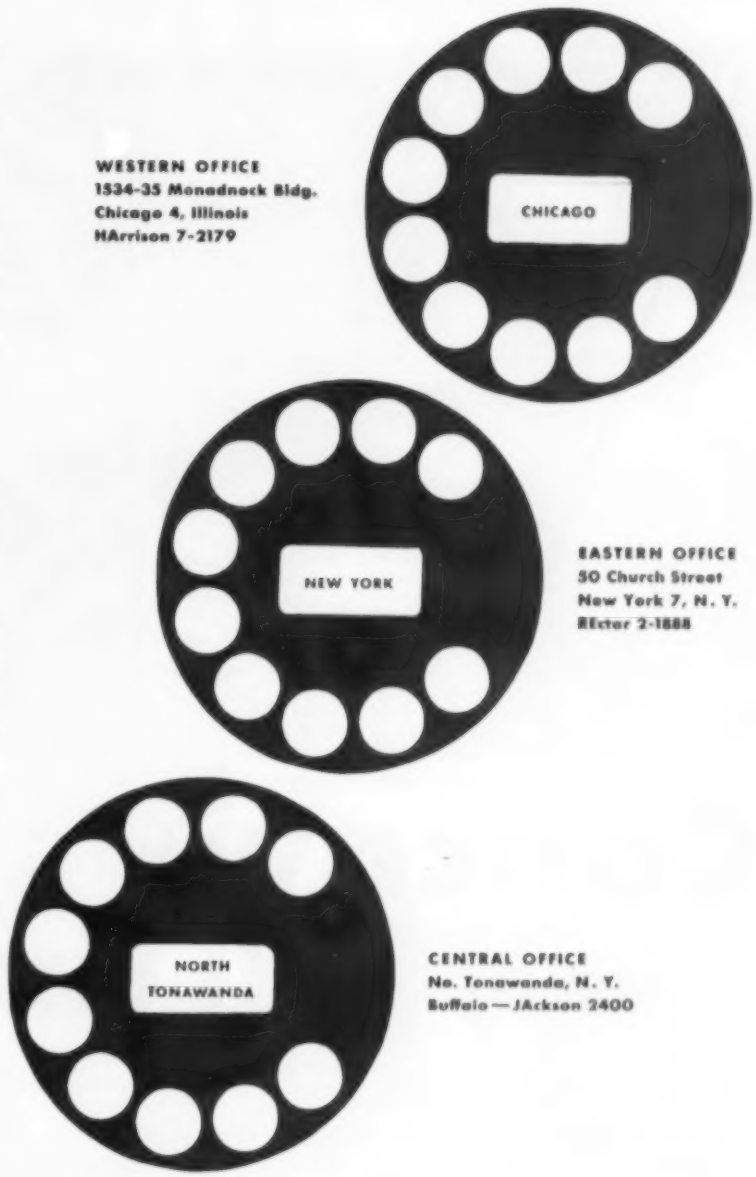
March 28-30, American Management Association: Manufacturing conference, Palmer House, Chicago. Association address: 330 W. 42nd St., New York 36. Vice president-secretary: James O. Rice.

March 28-April 1, Western Metal Congress & Exposition: Pan-Pacific auditorium, Los Angeles. Information: American Society for Metals, 7301 Euclid Ave., Cleveland 13. Secretary: W. H. Eisenman.

March 29-31, Steel Shipping Container Institute Inc.: Annual meeting, Biltmore hotel, Palm Beach, Fla. Institute address: 600 Fifth Ave., New York 20. Secretary: L. B. Miller.

March 29-April 7, American Chemical Society: Spring meeting, Cincinnati. Society address: 1155 16th St., N.W., Washington 6. Executive secretary: Alden H. Emery.

April 4-5, Stanford Research Institute and Atomic Industrial Forum: West coast conference on applied industrial uses of atomic energy, Mark Hopkins hotel, San Francisco. Information: Stanford Research Institute, Stanford, Calif.



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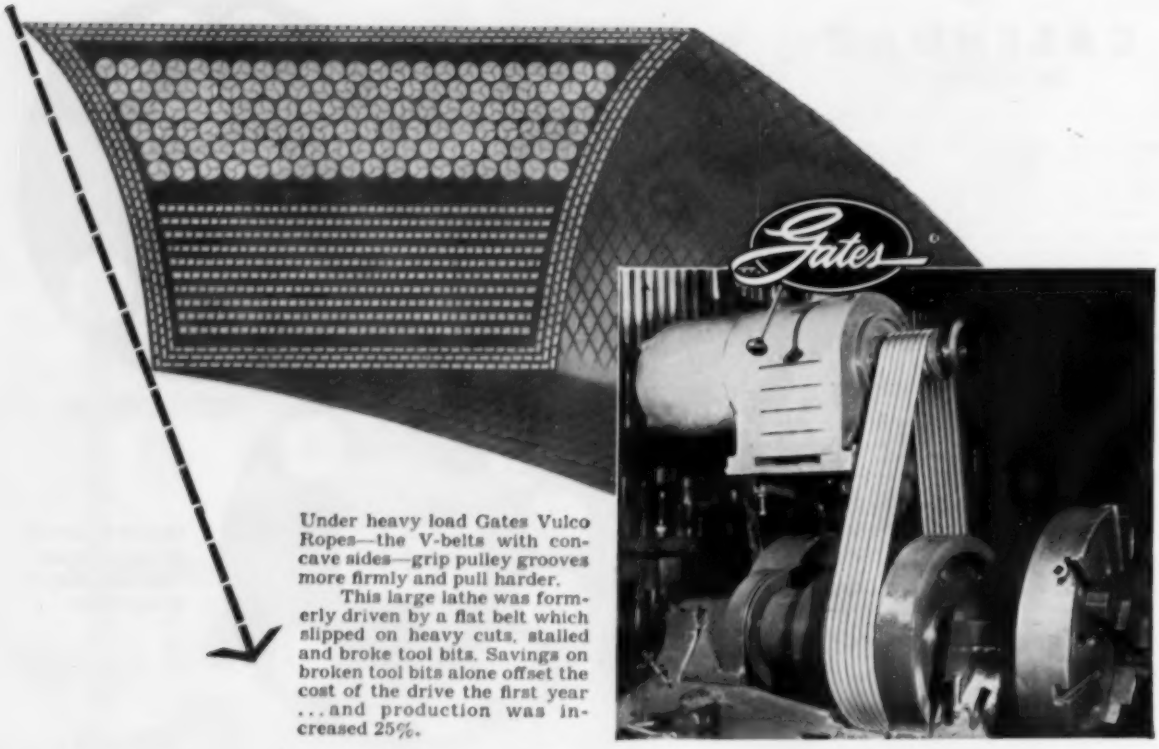


Under heavy load Gates Vulco Ropes—the V-belts with concave sides—grip pulley grooves more firmly and pull harder.

This large lathe was formerly driven by a flat belt which slipped on heavy cuts, stalled and broke tool bits. Savings on broken tool bits alone offset the cost of the drive the first year ...and production was increased 25%.

Concave sides keep belt costs down!

Industry is saving thousands and thousands of dollars every year by specifying Gates Vulco Ropes—the V-Belts with *concave sides* (U.S. Pat. No. 1813698).

Here's the interesting reason *why* Gates belts save money:

On the bend around the sheave the *precisely engineered* concave sides (Fig. 1) of the Gates belt fill out and become straight (Fig. 1-A). Thus the belt makes uniform contact with the sides of the pulley. That means sure pulling power and *even distribution of wear*. Longer wear, fewer replacements cut belt costs...reduce down time...contribute to profits.

Simple test proves value of concave sides

Bend a straight-sided belt (Fig. 2) and feel the sides *bulge out* around the bend. The bulging sides prevent the belt from fitting evenly in the pulley groove (Fig. 2-A). Uneven contact causes uneven wear...shortens belt life...increases costs.

Keep belt costs *down* by specifying Gates Vulco Rope Drives—the V-Belt with *concave sides*. Belts you need are readily available from nearby distributor stocks. The Gates Rubber Company, Denver, Colorado—*World's Largest Maker of V-Belts.*

Gates Engineering Offices and Distributor Stocks are located in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

TPA 25-A

GATES VULCO ROPE DRIVES

This Month's

GEAR PIX

7/10 MINUTE FOR 118 TEETH—Stacked back to back, two 6" diameter blanks have 59 teeth on each formed in 0.70 minutes on this SHEAR-SPEED gear shaper, in a large gear plant. Loading time is held to a minimum with automatic hydraulic clamping.

TRUE RADIUS FILLETS—True .070" radius fillets (for maximum strength) at the base of each spur tooth are formed simultaneously on these 17-tooth gears. The 7/9 diametral pitch 1¼" face width countershaft gears are cut on two SHEAR-SPEED gear shapers manned by one operator on a truck gear production line.

12 SECONDS FOR FINISHING—Floor to floor shaving time on these overdrive pinions is 12 seconds. Operator loads the chute through the size control fixture, the rest of the cycle is automatic. Average production is 40,000 pieces between cutter sharpenings. Stock removal is 0.003-0.005" over pins.

MICHIGAN TOOL COMPANY

7171 E. McNICHOLS RD. • DETROIT 12, MICH.

IN CANADA: COLONIAL TOOL CO., LTD.

NEW

PRECISION WAY to hob gears up to 23 ft. diameter

SCHIESS RF GEAR HOBBERS

Tremendous! Yes—and newly designed! Cut mammoth gears from 9 ft. to 23 ft. diameter with "lightweight" precision! Spur, helical and herringbone gears (including internal gears). Also wormwheels of either low- or high-lead angle.

Accurately centered fixed table supports blanks ranging from 20 to 80 tons. Moving column adjustable for both diameter of gear and depth of tooth. Cuts in either upward or downward direction. Huge master wormwheels assure accuracy of indexing movement. Tooth pressures of worms offset each other—no lateral stress.

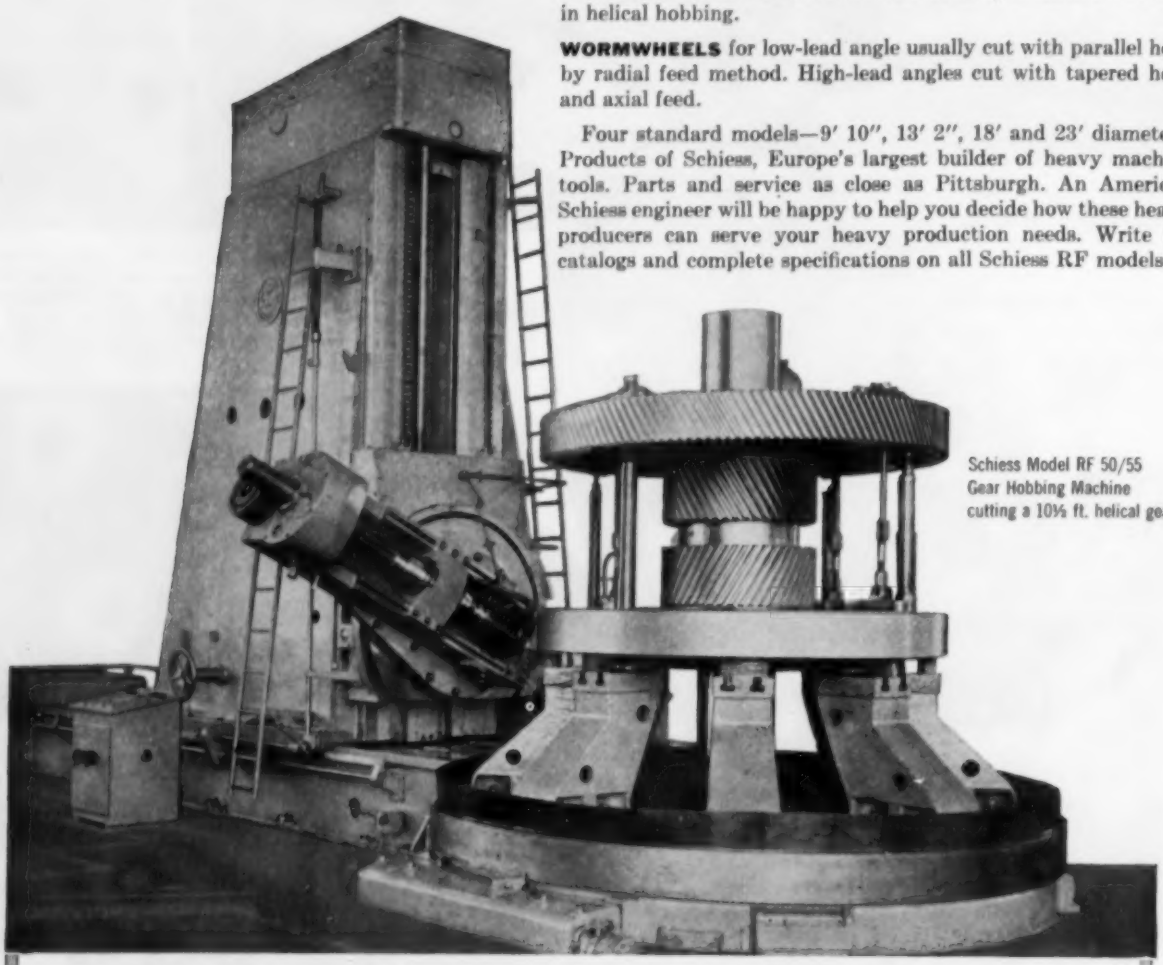
SPUR GEARS cut by driving work table through index change gears connecting with hob spindle drive.

SINGLE HELICALS (or double helicals with teeth separated by gap) produced by additional table movement—by means of differential gear provided with change gears.

HERRINGBONES cut with end mills by means of single indexing method. Additional table motion achieved by same method used in helical hobbing.

WORMWHEELS for low-lead angle usually cut with parallel hobs by radial feed method. High-lead angles cut with tapered hobs and axial feed.

Four standard models—9′ 10″, 13′ 2″, 18′ and 23′ diameters. Products of Schiess, Europe's largest builder of heavy machine tools. Parts and service as close as Pittsburgh. An American Schiess engineer will be happy to help you decide how these heavy producers can serve your heavy production needs. Write for catalogs and complete specifications on all Schiess RF models.



Schiess Model RF 50/55 Gear Hobbing Machine cutting a 10½ ft. helical gear.

Engineering Division
AMERICAN
SCHIESS
CORPORATION
38th Street and AVRR, Pittsburgh, Pennsylvania

Sole Distributor
KO KURT ORBAN COMPANY, INC.
34 Exchange Place, Jersey City, N. J.

A Better Buy With Local Supply

—Genuine CLARK Parts

Your local Clark dealer provides service facilities that have been developed for your needs. You expect the best from your Clark trucks and your Clark dealer is there to see that you get it. You get a complete *service package* at your local Clark dealer.

LARGEST SUPPLY— Your local Clark dealer's parts inventory is based on machine population. You get mobile service for emergencies . . . for preventative maintenance at your plant.

QUALITY PARTS— Your source for Genuine Clark parts. Designed specifically for your equipment . . . engineered to outlast, outperform any substitutes.

ONE SOURCE— for quality rebuilding, maintenance, parts, and mobile service. Complete, modern facilities offer the best in service . . . at lowest cost.

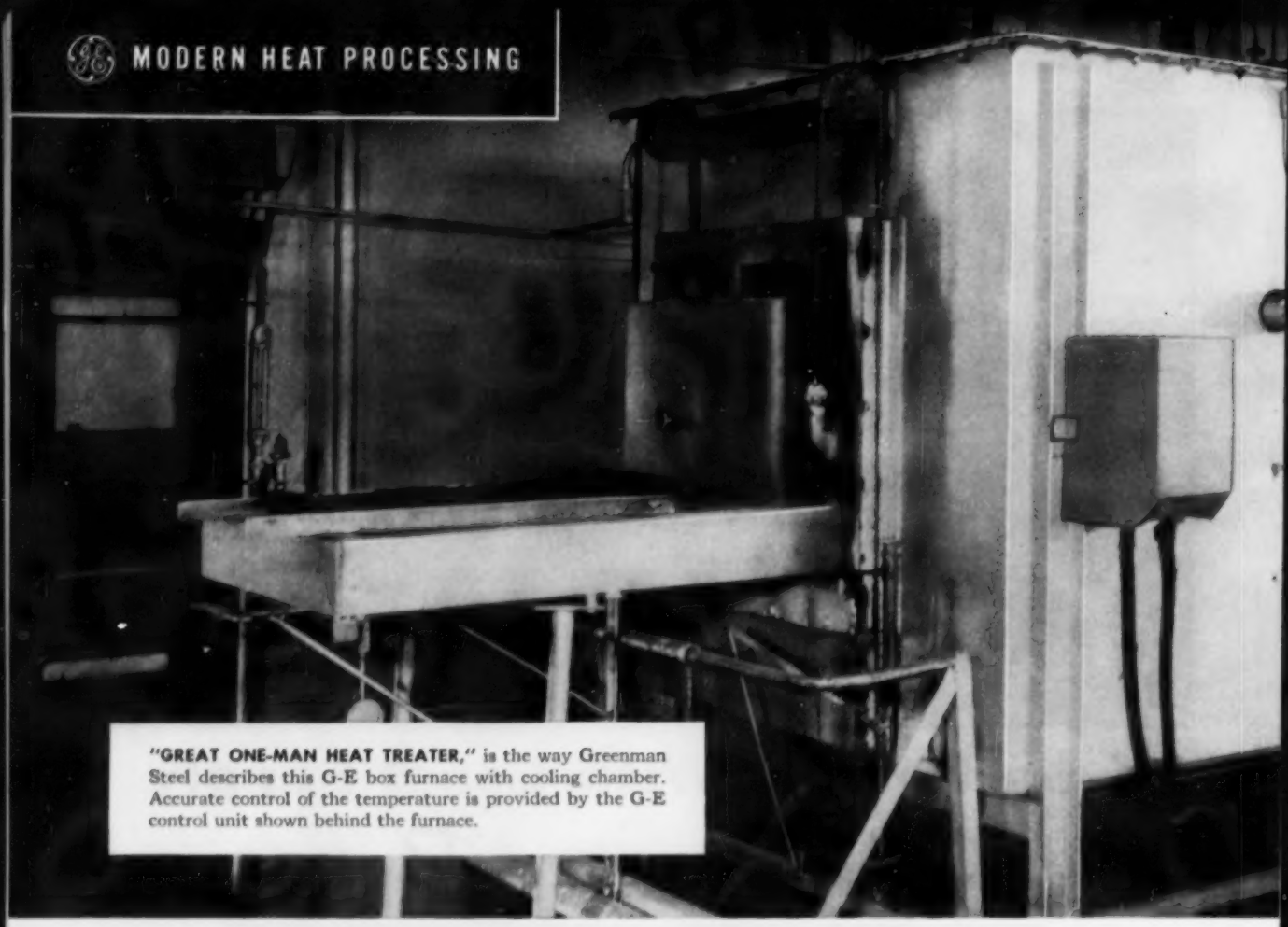
FACTORY TRAINED MECHANICS— use specially designed tools and test equipment . . . know your equipment best.

CLARK EQUIPMENT

Industrial Truck Division
CLARK EQUIPMENT COMPANY
Battle Creek 26, Michigan

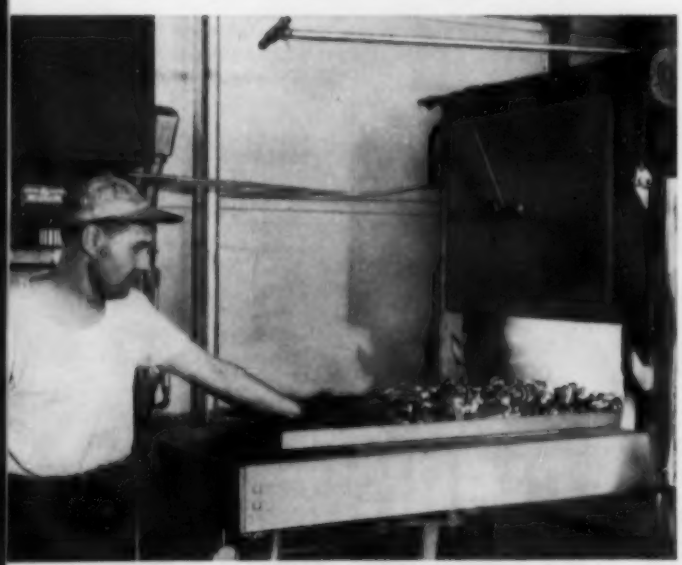
A BETTER BUY WITH LOCAL SUPPLY—GENUINE CLARK PARTS

MODERN HEAT PROCESSING



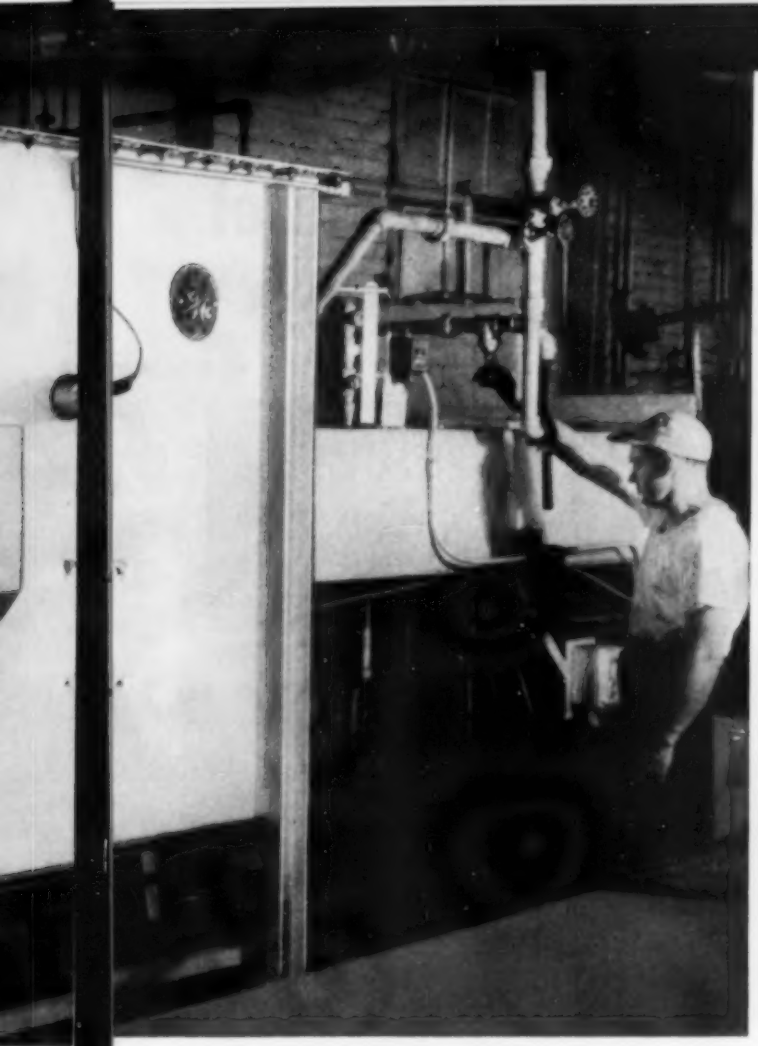
"GREAT ONE-MAN HEAT TREATER," is the way Greenman Steel describes this G-E box furnace with cooling chamber. Accurate control of the temperature is provided by the G-E control unit shown behind the furnace.

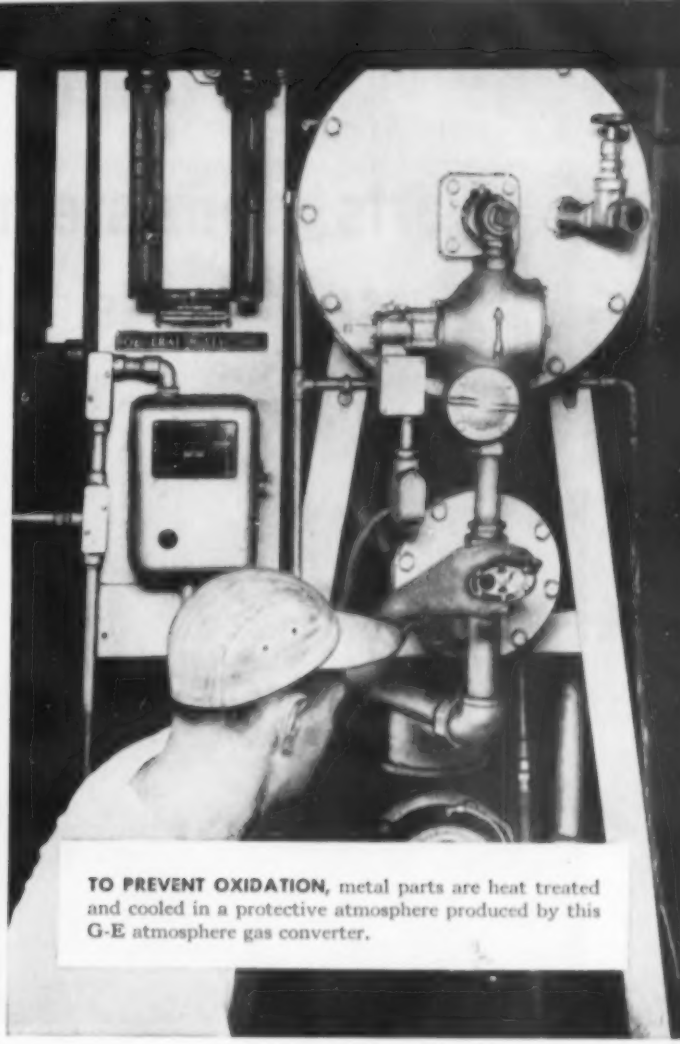
"Versatility of G-E Furnace Almost



MANY HEAT-TREATING JOBS can be done with this one G-E box furnace. Greenman Steel uses it for copper brazing, silver brazing, annealing, and hardening. Here, the furnace is employed to anneal drawn-steel cups.

HIGH-QUALITY WORK is achieved by moving the parts directly from the furnace to the atmosphere cooling chamber, thereby minimizing oxidation. Here, the parts emerge from the cooling chamber clean and bright.





TO PREVENT OXIDATION, metal parts are heat treated and cooled in a protective atmosphere produced by this G-E atmosphere gas converter.

Unlimited," Says Industrial Heat Treater

Operational savings of G-E furnace keep Greenman Steel competitive

Heat-treating jobbers who demand versatility in a furnace find that General Electric's box furnace with water-jacketed cooling chamber is ideal for general-purpose work.

Says Lloyd G. Field, General Manager of Greenman Steel Treating Corp., Worcester, Mass.:

"As a heat-treating jobber, we have to produce high-quality work at lower cost than equipment manufacturers can do it themselves. We must be ready to handle all sorts of heat-treating jobs, yet our investment in equipment must be kept to a minimum. We find that our G-E box furnace satisfies all these requirements. It enables us to stay competitive because it produces superior work at low cost. It minimizes our equipment costs because its versatility is practically unlimited. We use it to copper braze, silver braze, anneal, and harden."

MANY SAVINGS, HIGH-QUALITY WORK

Mr. Field pointed out that operating costs are low because the insulating qualities of the furnace minimize heat loss. Automatic control of the heat assures him of high-quality work.

FOR APPLICATION HELP

Whether your operation demands a small-capacity, all-purpose furnace, or one that is engineered for a particular process and intended for high-production rates at the lowest possible cost, General Electric can satisfy your requirements. For application help from a G-E Heating Specialist, contact your G-E Apparatus Sales Office.

GENERAL ELECTRIC

WRITE NOW FOR THESE MODERN HEAT PROCESSING BULLETINS

- Furnace and Induction Brazing, GEA-5889
- Heat-treating Aluminum, GEA-5912
- Annealing Malleable Iron, GEA-5797
- Protective Atmosphere, GEA-5907
- Forging with Induction Heat, GEA-5983
- Wire Enameling, GEA-6179

Address: General Electric Co., Section 720-129, Schenectady 5, N. Y.

Converts from steam engines to diesel ...uses Morse Silent Chain Drives

Case-enclosed Morse Silent Chain Drive

Exclusive Morse Rocker-Joint. The only joint action is a rocking action, requiring less lubrication, and assuring extra-long service life.

The steam drives on four large dock cranes at the Pulpwood dock of Hammermill Paper Company, Erie, Pennsylvania, were converted by Great Lakes Diesel to 70-hp diesel engines with torque converters. They are used to drive 10-ton cranes which unload four-foot and eight-foot logs by chain slings from the lake steamboats.

The diesel drives use Morse Silent Chain, ¾" pitch x 4" wide, and include cases for the drives. The motor drive sprocket has 23 teeth, the driven sprocket 149 teeth.

Morse Silent Chain Drives transmit power smoothly and noiselessly, with over 99% efficiency. The service life of the drives is exceptionally long and trouble-free. Smooth, positive action reduces slippage losses on shaft bearings. The exclusive Morse Rocker-Joint construction converts sliding action to rolling motion. Morse Silent Chain Drives are compact, unaffected by atmospheric conditions.

Available in pitches from ⅜" to 2", these drives will handle fractional horsepower or hundreds of horsepower in a single drive.

For more detailed information on how precision-built Morse Silent Chain Drives can help you in your applications, contact your local Morse distributor. Or, write:

MORSE CHAIN COMPANY
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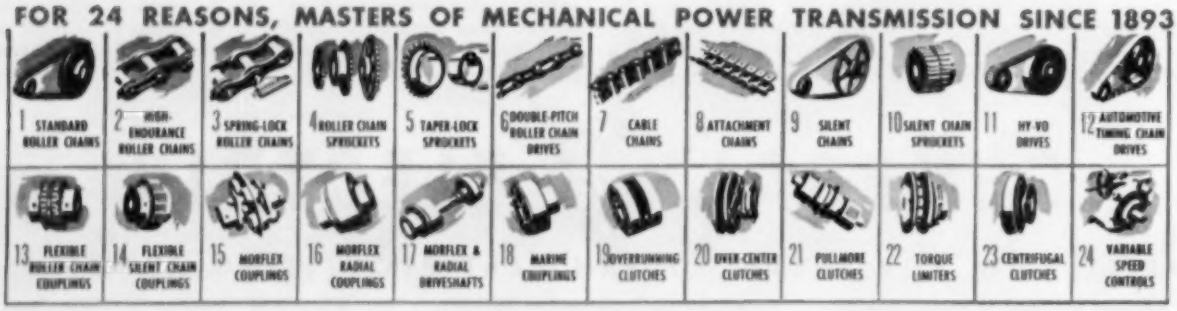
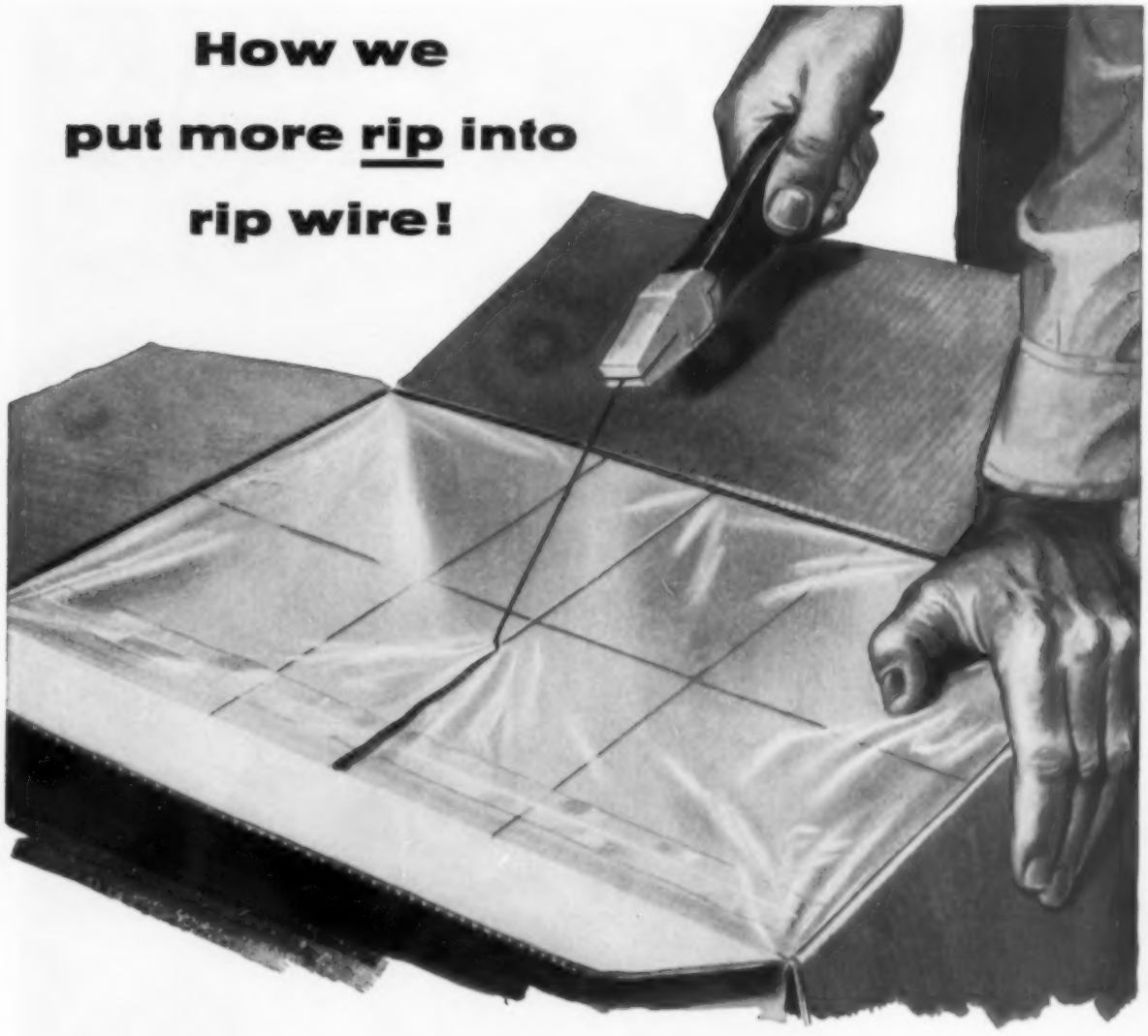
MORSE BW
MECHANICAL POWER TRANSMISSION PRODUCTS

FOR 24 REASONS, MASTERS OF MECHANICAL POWER TRANSMISSION SINCE 1893



How we put more rip into rip wire!



● Industry often wraps its products in heavy paper to protect it from damage due to moisture, handling and other causes. To make these packages or bundles easier to open, *Worcester Wire Works* has developed a special rip wire for inclusion in the wrapping.

To get even greater protection, some products are wrapped in plastics rather than paper. And this caused a problem. Ordinary rip wire wouldn't cut the tough plastic.

Our *Worcester Wire Works Division* solved the problem by developing a special rip wire with a knurled surface that literally put teeth into the wire. It cuts through the toughest plastic coating as easily as a buzz saw.

Not all of the problems we solve for industry have such simple solutions. Often, we are called upon to develop steel and wire with completely new characteristics . . . to combine seemingly incompatible factors or properties. And quite frequently these are developments that other manufacturers have given up on.

If you have a problem calling for special development work in steel or wire . . . either in creating a product or finding new and better ways to make or use it . . . it will pay you to write or call National-Standard.

NS NATIONAL-STANDARD Company NILES, MICHIGAN

NATIONAL-STANDARD COMPANY • NILES, MICHIGAN
Tire Wire, Stainless, Fabricated Braids and Tape
ATHENIA STEEL DIVISION • CLIFTON, N. J.
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Special Machinery for Metal Decorating
WORCESTER WIRE WORKS DIVISION • WORCESTER, MASS.
Round and Shaped Steel Wire, Small Sizes

(Advertisement)

Thompson Wire Company anneals cold rolled strip with *GAS*

These are Gas-fired annealing facilities at Thompson Wire Company, Baltimore, Maryland. Here, modern industrial Gas equipment anneals cold rolled strip and assures proper quality for a variety of applications.

Coils of strip are placed one on top of the other on a stationary base. Then, a portable Gas-fired bell furnace is lowered over the stacked coils. Twelve Eclipse Gas burners heat the coils to the proper annealing temperature in a prepared inert gas atmosphere released from inner cones. After firing, the furnace is lifted from the base and replaced with a cooling hood which helps slow down and equalize the cooling rate. Finally, the hood is removed and the coils of strip are lifted from the base.

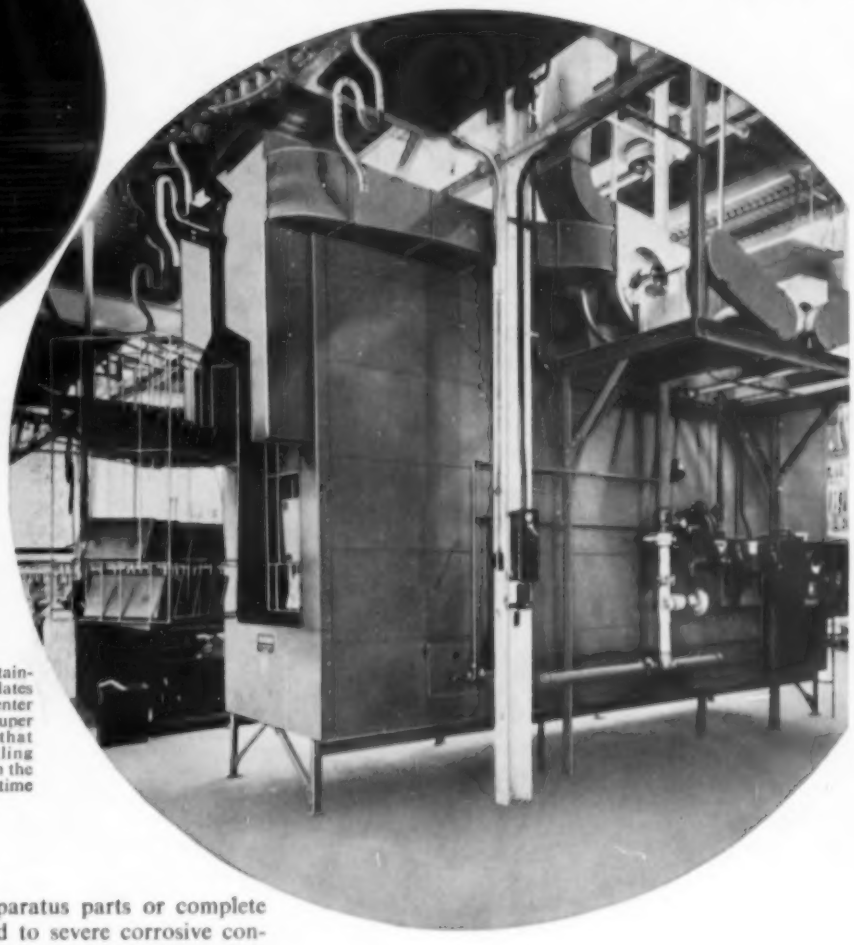
With Gas, Thompson Wire Company can anneal up to 50,000 pounds of strip in 36 hours. Thompson Wire also uses Gas for water heating.

For further information on how Gas can help you in your heat treating operations, call your Gas Company Industrial Specialist. He'll be glad to discuss the economies and results Gas and modern Gas-fired industrial equipment can provide. *American Gas Association.*

In Small Parts or Large...

Carpenter Stainless No. 20 Controls STRONG Corrodents

SMALL—This diagram shows float and attached steel indicator strip of an automatic gauge used in sulphuric acid storage tanks. These parts are made from Carpenter Stainless No. 20 and No. 20Cb for longer life.



LARGE—Carpenter Stainless No. 20Cb sheet, plates and tubing, and Carpenter No. 20 bars provide super corrosion resistance that keeps huge acid-pickling machines like this one on the job, saves maintenance time and expense.

Wherever you have small apparatus parts or complete large-scale equipment subjected to severe corrosive conditions, you can build extra service life into them with Carpenter Stainless No. 20 and No. 20Cb.

This super stainless alloy is highly resistant to H_2SO_4 concentrations or solutions, as well as a long list of other strong corrodents. So build with Carpenter Stainless No. 20 and No. 20Cb for greater freedom from corrosion troubles, extended equipment life, less down-time for replacements, and greatly reduced corrosion control costs.

This time-saving, cost-cutting super corrosion-resistant Carpenter stainless alloy is available in the form of No. 20Cb tubing, pipe, sheet and plate, as well as No. 20 bar, wire, strip, and billets. Ask your nearest Carpenter distributor or sales office for assistance on your corrosion problems . . . and a copy of the NEW Carpenter Stainless No. 20 and No. 20Cb handbook.

MEMBER

The Carpenter Steel Company, Alloy Tube Division, Union, N. J.

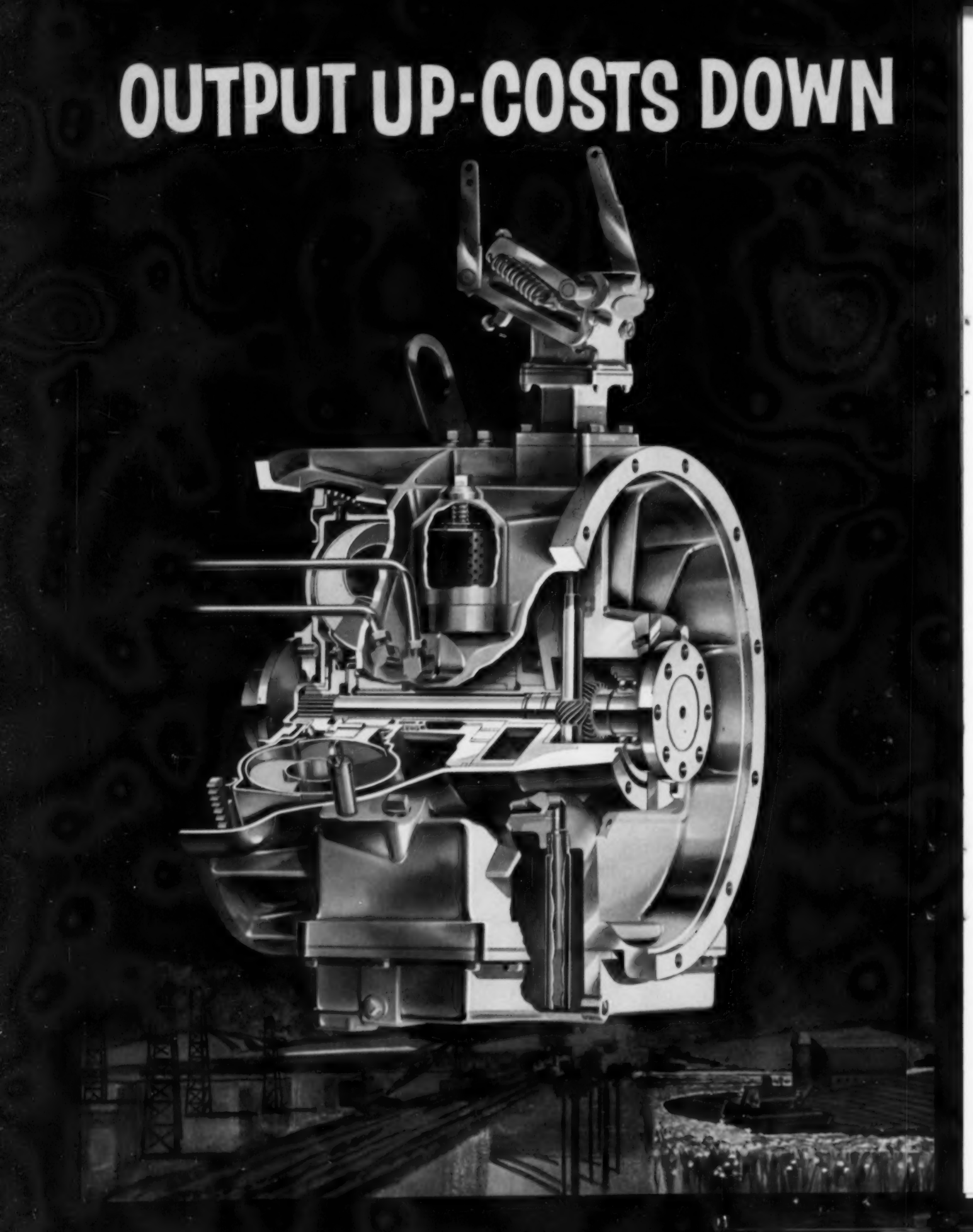
Export Dept., The Carpenter Steel Co., Port Washington, N. Y.—"CARSTEELCO"

Carpenter

Stainless Tubing & Pipe

For information on Carpenter Stainless No. 20 strip, wire, billets, contact The Carpenter Steel Company, Reading, Pa.

OUTPUT UP-COSTS DOWN



with the new CHRYSLER Industrial Torque Converter

Now available for installation on Chrysler Industrial Engines

Chrysler—famous the world over for truly engineered performance—offers a New Industrial Torque Converter designed and built to fill the intermittent need for greater torque within the recommended power range . . . employed in any application.

The New Chrysler Industrial Torque Converter provides torque multiplication of 2.6 with almost 97% efficiency in coupling range. For the first time here's a torque converter with provision for a *built-into-the-housing* speed control device. This feature, optional equipment, automatically adjusts torque converter speed to variations in road and load conditions, making it unnecessary to rely on less sensitive engine governor. Dual cooling, liquid and direct-air, dissipates torque converter heat faster enabling more efficient operation.

The engines powering your equipment now may lack the torque they occasionally need. Here's a way to solve that added requirement *without* installing an otherwise unnecessarily large engine. Check into these and the many other advantages of the New Chrysler Industrial Torque Converter. It's two-thirds the weight of cast iron competitive units which include provision for both transmission and power takeoff clutch. Its cost is amazingly low.

CHRYSLER
INDUSTRIAL
TORQUE
CONVERTER

PRODUCT OF MARINE & INDUSTRIAL ENGINE DIVISION CHRYSLER CORPORATION TRENTON, MICHIGAN

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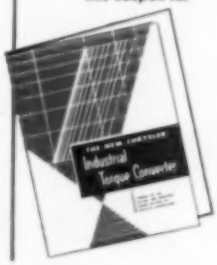
Simply fill out, clip and mail this coupon to:



Chrysler Industrial Torque Converter
Dept. 83, Industrial Engine Division
Chrysler Corporation
Trenton, Michigan

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Naturally... American Phillips Screws Cost More...BUT only 'til you put them to Work!

The million-dollar question is not whether you can afford to use American Phillips Screws . . . *but whether you can afford not to use them.* For when American Phillips fourfold savings take hold in your assembly departments . . . easier handling, faster driving, tighter fastenings, safer work conditions . . . then you have the lowest-cost operation you can get by any fastening method (*as much as 50% below present costs*).

American has set up startling economies in some highly unlikely places, by applying the know-how gained during the years since American first introduced the Phillips Screw to industry. Let us economy-test your operations. Write:

✖ *marks the spot*
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Plants at Willimantic, Conn. and at Norristown, Pa.
Warehouse and office at Chicago
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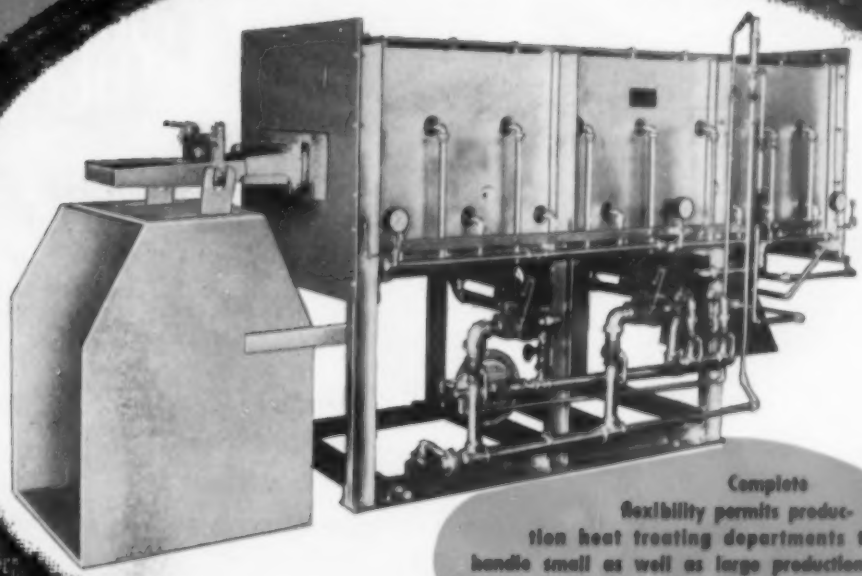
New RECIPROCATING HEARTH FURNACE

Patent 2,671,654

by AGF Pioneers, the originators and builders of Reciprocating Furnaces since 1921. Features include stationary muffle and complete atmosphere control.



Complete flexibility permits production heat treating departments to handle small as well as large production lots on a continuous basis.

Carburizing, case hardening, NI-Carb process of ammonia-gas carburizing, clean hardening, etc. of parts ranging from balls for ball point pens to heavy forgings can be accomplished with ease in the same model without any modification.

Newly engineered fully automatic feeding device is now available to eliminate costly work handling in charging the furnace.

Individualized treatment assures uniformity of product. Each piece is individually heated, subjected to the atmosphere and quenched. Disadvantages of batch heating and quenching are eliminated. Work can be observed throughout the processing cycle.

Only the work enters and leaves the heating chamber. Baskets, trays, chains and other troublesome mechanisms are completely eliminated.

Sizes in production capacities up to 600 pounds per hour.
Representatives in principal cities.

AMERICAN GAS FURNACE CO.
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ELIZABETH 4, N. J.

Send your Bulletin 850 which will help us produce a quality product at lowest cost.

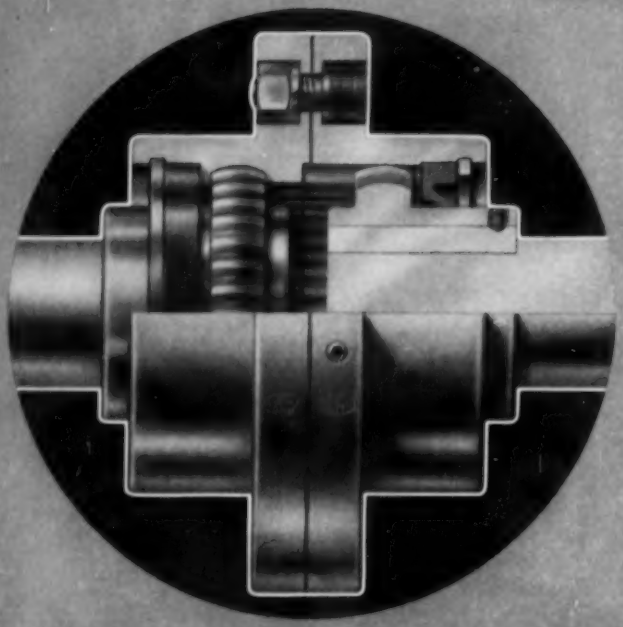
NAME..... TITLE.....

COMPANY.....

ADDRESS.....

A BETTER GEAR COUPLING

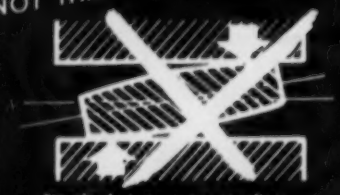
...with teeth cut on a true ARC



SPHEREFLEX

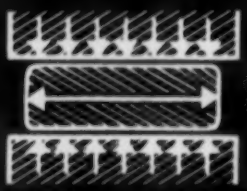
- UP TO 7° ANGULAR MISALIGNMENT
- FULL FACE TOOTH CONTACT ALWAYS
- CONSTANT ANGULAR VELOCITY

NOT THIS



Standard gear type coupling—note excessive backlash and stress concentration when coupling is flexed.

THIS



"SPHEREFLEX" teeth do not depend on backlash—teeth mesh snugly together, tolerances are reduced to absolute minimum.

The new and different "SPHEREFLEX" Coupling has been exhaustively tested in a wide variety of severe applications — and in every instance has proved itself a superior coupling. "SPHEREFLEX" Couplings are now available from stock at competitive price levels with conventional couplings.

The "SPHEREFLEX" is different and better, because the male teeth are cut on a "true spherical arc", while the internal teeth are cut with a straight root — permitting the curved tooth to always maintain a full line of contact with internal tooth even when the coupling is flexed. . . . Also this feature eliminates the usual dependency for flexibility upon excessive backlash between coupling teeth, point contact or springs. . . . In fact, size for size, the "SPHEREFLEX" Coupling will withstand higher horsepower and greater misalignment than any other comparable coupling. Standard "SPHEREFLEX" Couplings will compensate for angular misalignment up to 3½° plus or minus on each coupling half, or a total of 7°. Special "SPHEREFLEX" Couplings are available for 14° misalignment. Write for new Catalog C-540.

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NEW YORK • PITTSBURGH • CHICAGO • HOUSTON • LYNCHBURG, VA.
Virginia Gear & Machine Corp., Lynchburg, Va.

Industrial Gears & Speed Reducers

LimiTorque Valve Controls

established 1892

3,000-ton R. D. Wood high speed forging and cogging hydraulic press. Used for forming, forcing, upsetting, impact extrusion. Handles aluminum, bronze, magnesium, steel, brass and other metals. Construction provides rigidity, plus the very accurate guiding essential in die forging and other press operations. Send for complete details of this and other R. D. Wood presses for the metal working industry.

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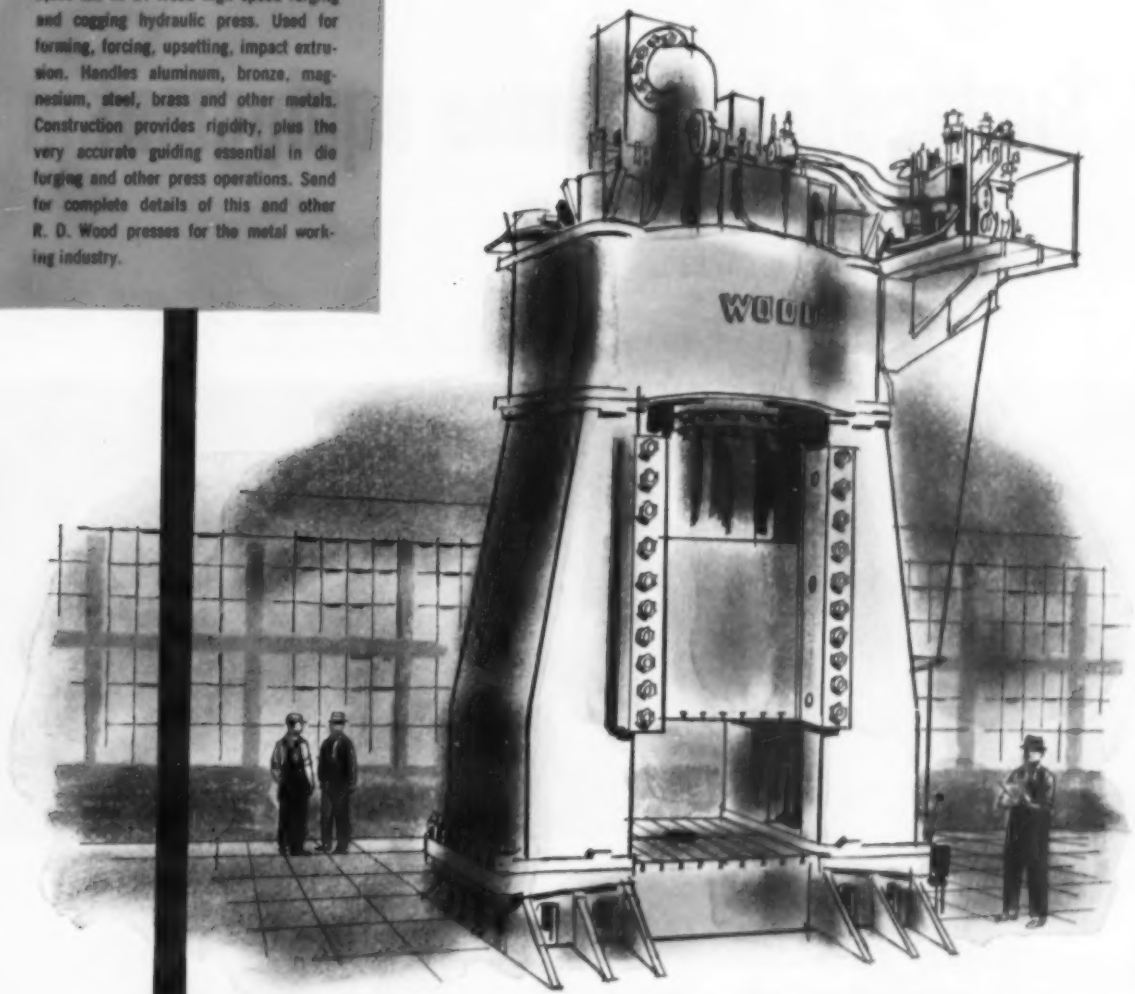
This is not an empty claim. It's a fact and a challenge.

In more than 150 years of service to industry, R. D. Wood's name has never appeared on a press of inferior quality.

You can *see* the proof of R. D. Wood quality in the precise design, select materials, and sound craftsmanship that distinguish our presses. And you can *see* the results of this quality in smooth, dependable performance, increased production, economical maintenance.



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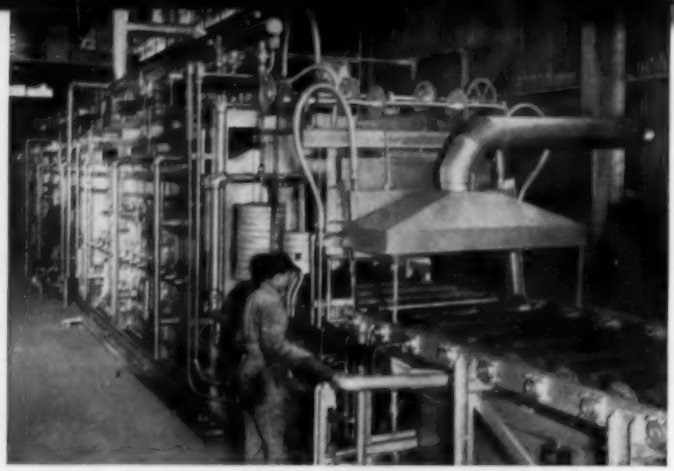
MAKERS OF HYDRAULIC PRESSES AND VALVES • FIRE HYDRANTS • CAST-IRON PIPE • GATE VALVES • GAS PRODUCERS • ACCUMULATORS

continuous processing

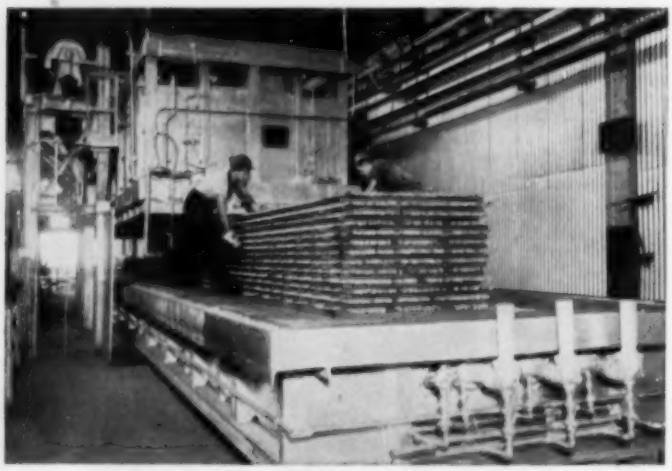


'Surface' roller hearth furnace for continuous carbon restoration-annealing of bars and coils.

'Surface' atmosphere equipment

'Surface' lift cover car bottom furnace used for batch carbon restoration-annealing of bar stock.

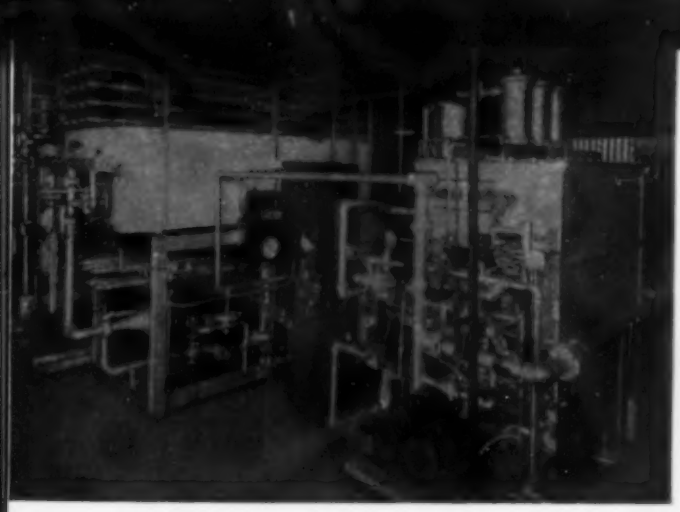
batch processing



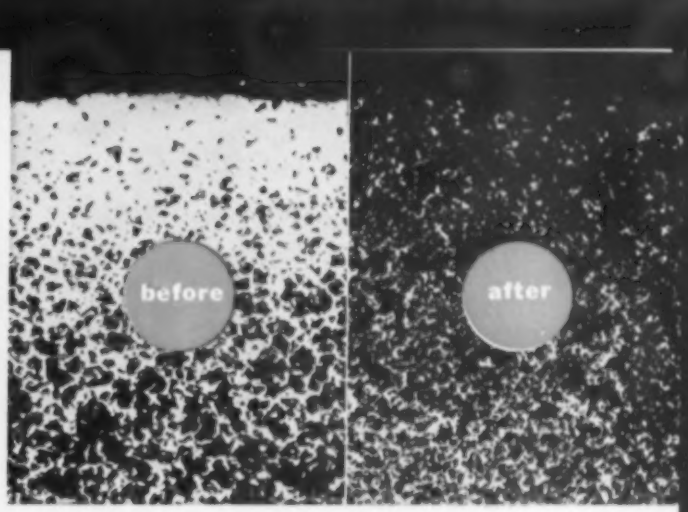
Here are a couple of graphic reminders that Surface Combustion atmosphere equipment helps meet today's demands for top quality steel.

These cases repeat a familiar story in the steel industry: a steel processor wants to improve the metallurgical qualities of his stock—'Surface' equipment meets, and frequently exceeds, his specifications.

In your current program for improving the marketability of your products, look to 'Surface' to provide the right atmosphere for easier sales.



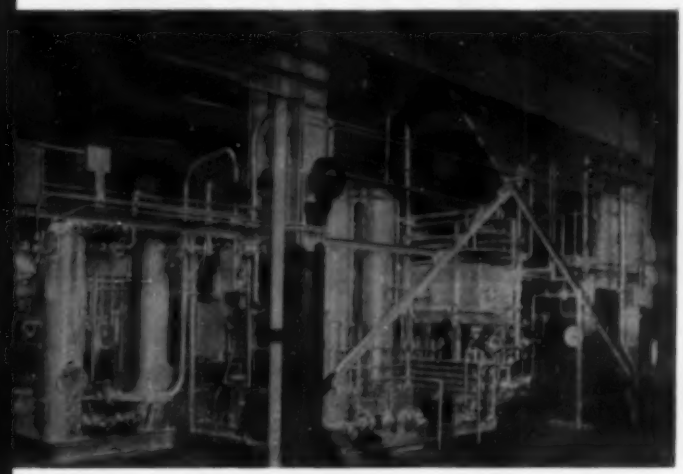
'Surface' atmosphere generators for this installation. RX unit in the foreground, NX unit in the background.



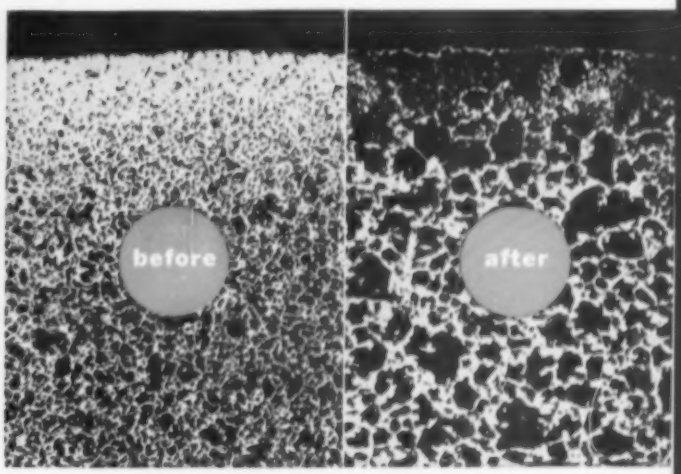
Before and after photomicrographs, Carbon steel AISI C1050. The results: carbon restored to the decarburized skin; steel which reduces the customer's machining costs, eliminates rejects.

makes steel easier to sell

'Surface' atmosphere generators next to the furnace. NX generators and coolers in the foreground, RX generator and dew point recorder in the background.

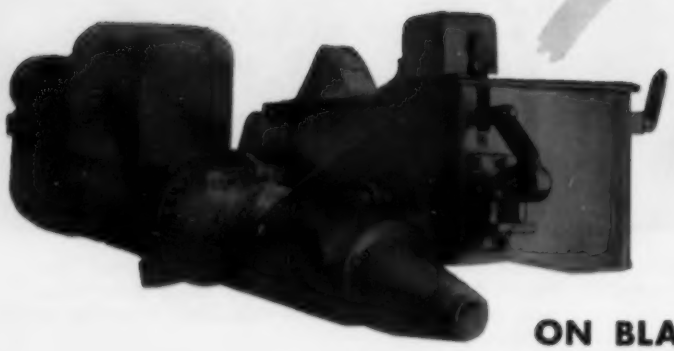


Before and after photomicrographs, C-1045, 1 1/16" round, coarse grain, 75x, 4% Nital etch. The results: carbon restored to the decarburized skin; steel that sells and opens new markets for the processor.



Surface
STEEL MILL FURNACES

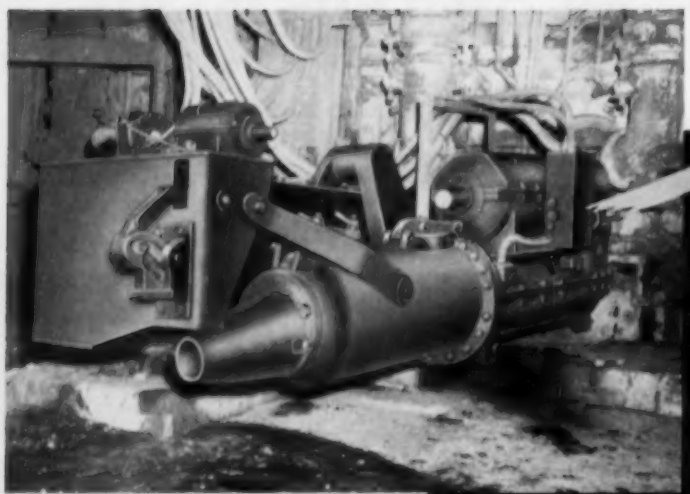
SURFACE COMBUSTION CORPORATION · TOLEDO 1, OHIO



Controlled POWER

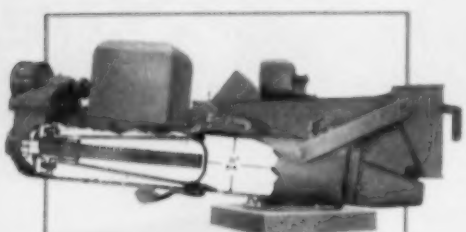
FOR PLUGGING
TAPPING HOLES

ON BLAST FURNACES
ON LARGE ELECTRIC FURNACES



Bailey CLAY GUNS

Long a standard of precision and safety on blast furnaces, Bailey Clay Guns now are used on large electric furnaces as well.



The plunger is driven by a highly efficient power screw and double reduction gear drive. Design is such that Bailey Clay Guns are operated by three separate motor drives.

These guns supply clay under high pressure exactly where it is needed to give best results and safety in quickly plugging tapping holes. Fast, accurate and solid positioning is assured by an exclusive pedestal support and lever mechanism. Since the electrically-driven piston develops a clay pressure of 600 psi, there is ample power to maintain long tapping holes.

WILLIAM M. Bailey COMPANY
ENGINEERS
LEADERSHIP THROUGH QUALITY

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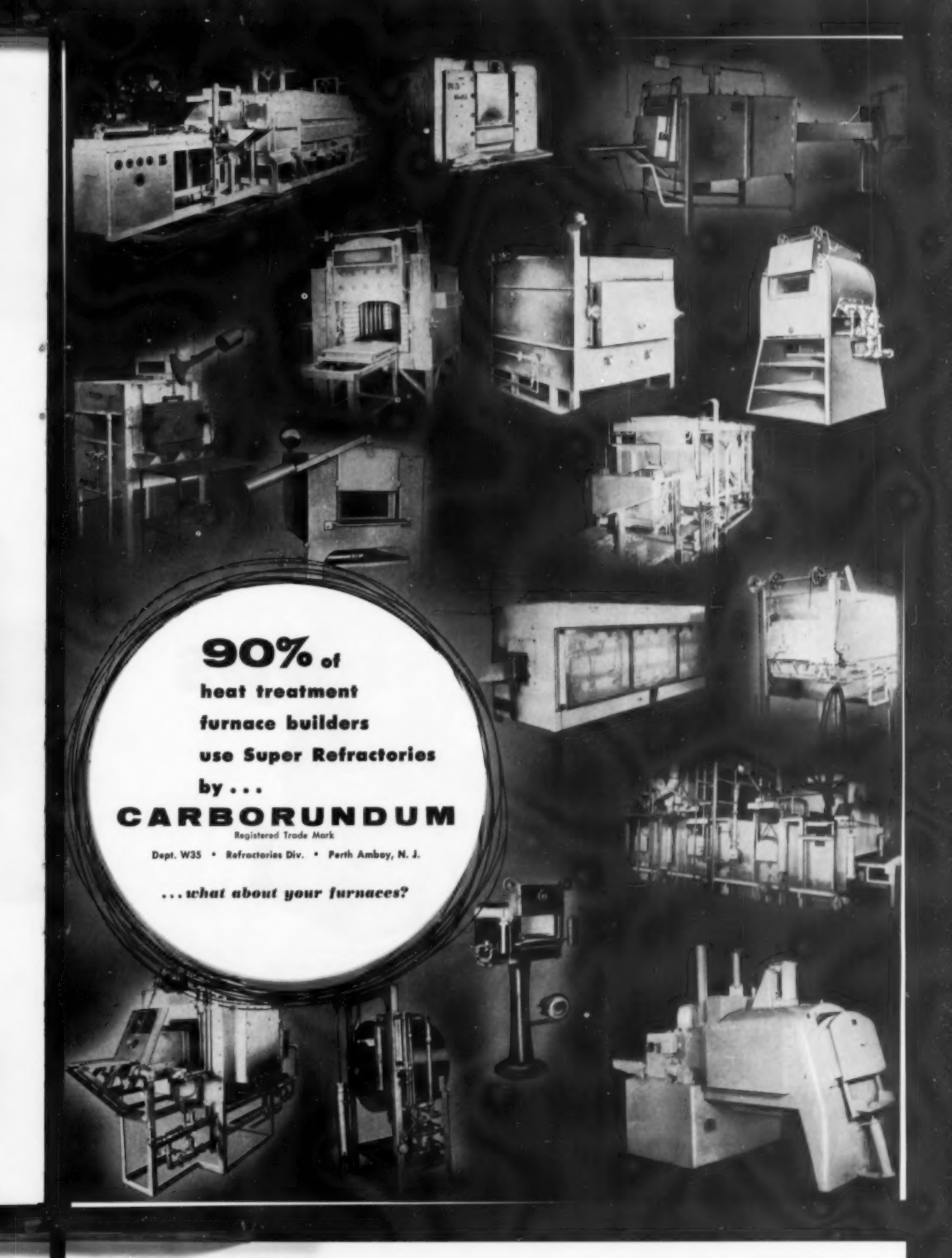
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The only gravity drop hammer with short stroke control

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Builders of THE IMPACTER

"FORGING IN MID-AIR"

CHAMBERSBURG, PENNSYLVANIA

Part of complete Link-Belt conveying system in Eastern steel mill, this 1900 ft. storage belt conveyor can be discharged at any point by traveling tripper-stacker.

SURE ROAD TO LOWER HANDLING COSTS

... carry the load via Link-Belt belt conveyors

LINK-BELT offers you the "total engineering" so necessary for top efficiency

DESIGNED FOR OVERALL EFFICIENCY—Because of its unrivaled experience, Link-Belt can do a better job of gathering and analyzing all data. Proposals reflect this understanding of the most practical way to fit individual conveyors into your overall system requirements for best results.

BUILT FOR LONG-LIFE PERFORMANCE—Link-Belt manufactures all components and related feeders and conveyors. You are assured of the right equipment because of this breadth of line. And Link-Belt will supply the highest grade belts engineered to the specific job.

DELIVERS FULL RATED CAPACITY—Link-Belt follows through on every detail of the job, including electrical controls and even wiring and foundations. What's more, Link-Belt will furnish experienced erection superintendents, staffs and skilled crews at the customer's request.

ASSURES SATISFACTORY PERFORMANCE—When you rely on Link-Belt as a single source for your complete system, we accept responsibility for placing it in full operating readiness. We will also supervise modernization of existing systems. For all the facts call your nearby Link-Belt sales representative.

LINK-BELT

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LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

13.606-C

Flash butt-welding of mill-rolled sections will save $186,888.00 this year for one jet engine manufacturer

By designing the mill rolled section shown above, instead of using a rectangular bar, 98 lbs. of metal per ring was saved. The cost of fabricating rings was reduced $77.87 per ring.

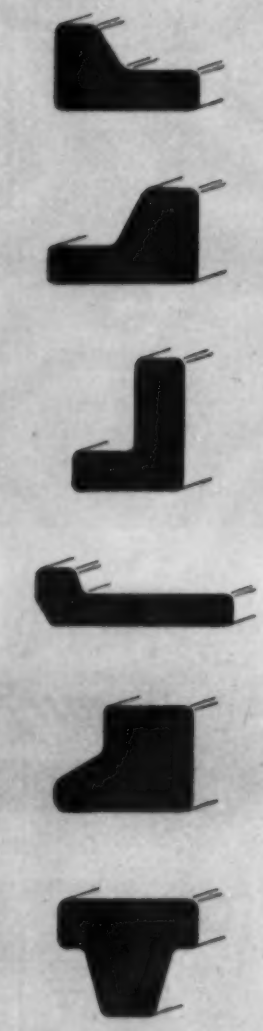
Are you using machined rings or bands? Rolling and flash butt-welding of special mill-rolled sections may be able to effect similar economies. Write today for complete information. Our Product Development Division will be glad to work with you.

THE AMERICAN WELDING & MFG. CO. • 110 DIETZ ROAD, WARREN, OHIO

AMERICAN WELDING

WELDING • MACHINING • FABRICATING

TYPICAL STAINLESS MILL ROLLED SECTIONS



Send for Free Catalog— of Production Facilities, 24-page booklet showing what American Welding can do for you.

STEEL
March 14, 1955

Metalworking Outlook

Mr. McDonald Has Troubles

United Steelworker President David J. McDonald has political fence repairing to do within his union. Opposition showed up over his support of Howard R. Hague to succeed the late James Thimmes as vice president. But that's just a surface indication of dissatisfaction. Some elements in the union dislike Mr. McDonald's announcement that he will seek no guaranteed wage this year. And there's fear that the president has failed to assure the organization of an important role in the proposed AFL-CIO merger. Mr. McDonald is already at work smoothing things over. He wants a united front when he starts wage negotiations with the steel industry about May 1.

New Twist on Old Theme

Look for a new twist on an old theme when the CIO electrical workers negotiate with radio, television and electronics companies this year. The union will not fight automation or other additional mechanization, but it wants to "share in the profits" of those developments. One profit-sharing scheme to be "vigorously" pushed will be the guaranteed annual wage. The 87 companies in electronics with which the union has contracts can also expect demands for a new job classification for workers on automatic equipment, new production bonuses, revision of seniority provisions to give displaced workers a broader area of other work to move to and establishment of joint labor-management committees to study problems arising from automation.

More Pay Cuts Coming?

Watch for more companies like Otis, Studebaker-Packard and Kaiser to demand that their workers accept pay cuts. The latest are Sparks-Withington Co., Jackson, Mich., and Electric Auto-Lite Co., Toledo. As of last week, the proposals had been turned down by the UAW locals, but the way was left for reconsideration. In the first three cases, management won its point when it proved that its pay scales were out of line.

Right-To-Work Laws Hold

Attempts to repeal right-to-work laws have been voted down in Arkansas, South Carolina, North Dakota and Tennesseee. The Utah legislature has enacted a new right-to-work law. Idaho has just rejected one.

Leasing: Success at Clark

Leasing plans are working unusually well for materials handling equipment makers. George Spatta, Clark Equipment Co. president, says he's surprised by the number of bigger firms which take advantage of the method. "They find the leasing of rolling stock is easier than leasing

Technical Outlook—p. 103 Market Outlook—p. 135

machinery which has to be bolted to the floor." He also says about one of every five sales of Clark fork lift trucks is on a lease plan.

Tool Pool Plan Again

Another pool order program for machine tools is in the talking stage. Machine tool men and interested government agencies are considering the pros and cons of a plan that would theoretically permit tool builders to begin defense equipment production immediately in case of mobilization. Planners visualize a minimum pool of $500 million in general purpose machinery at the start. Congress may be asked to approve some type of contingent liability payment scheme to help finance the program.

Construction: Relative Matter

The physical volume of construction today is moderate when compared to the boom level of the 1920s. The National Industrial Conference Board points this out: When construction spending is adjusted for cost differences and measured in constant (1947-1949) dollars, outlays average only $19.4 billion in 1950-1954, compared to $18.7 billion in 1925-1929. Private building expenditures in 1925-1929 ran about 13 per cent of the gross national product. They were 6 per cent for 1950-1954.

Cure for 'Contributitis'

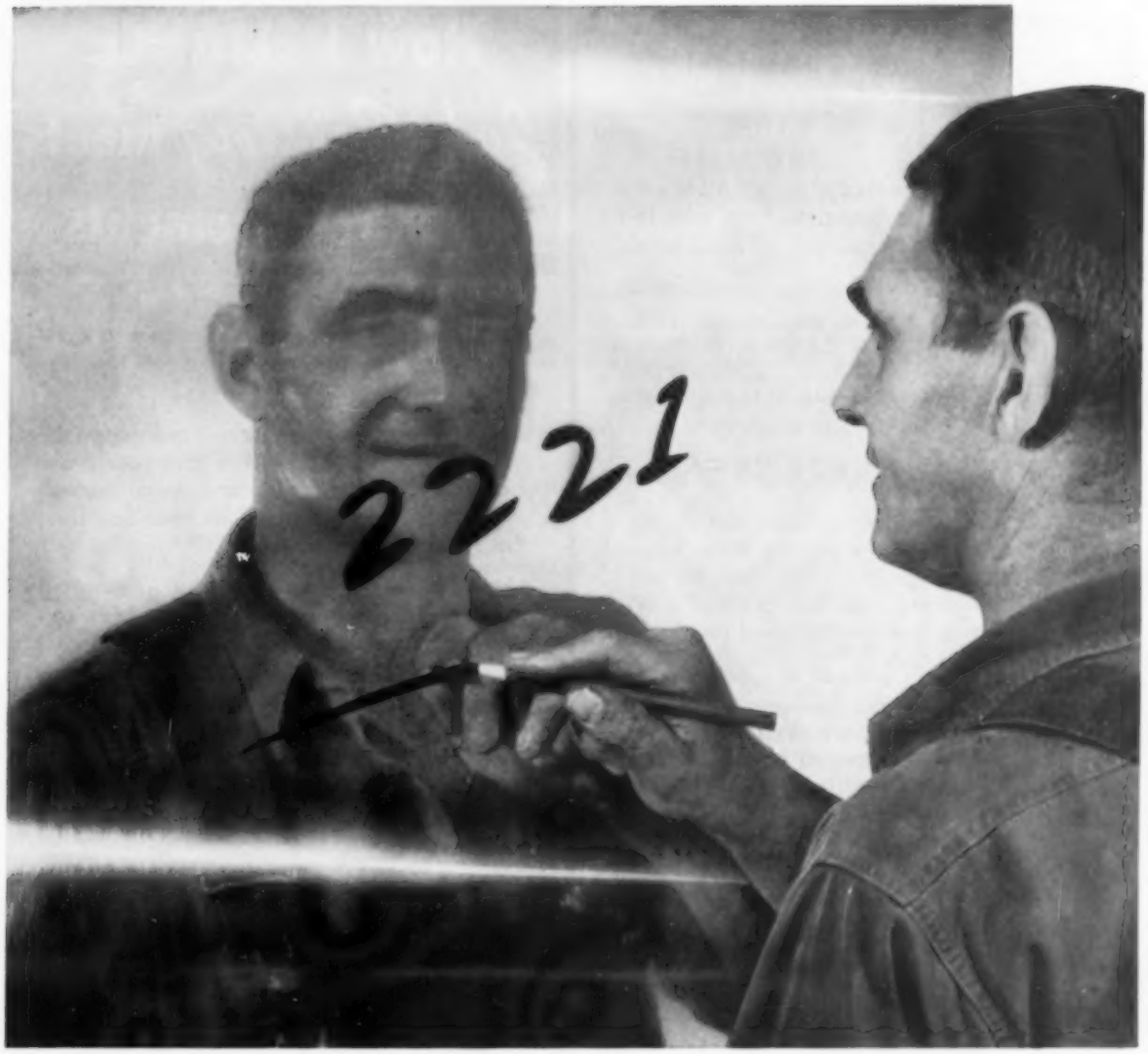
Does your company suffer from "contributitis"? Bankers Trust Co., New York, is experimenting with a plan to control the requests to contribute for flowers for workers who are sick, presents for new babies, wedding gifts, etc. Employees contribute 25 cents each bi-weekly payday. Gifts are purchased from the fund for specified occasions. The fund is audited, and regular reports are made to contributors.

Straws in the Wind

The Army has developed an atomic-powered engine that will fit into a tank . . . Houston is studying the possibility of a monorail rapid transit system . . . Watch out for "gypsy" electroplaters particularly active in the Midwest and West, reports American Electroplaters' Society; they show good samples but produce inferior work. They probably operate in trailers which house small plating shops . . . Wyman-Gordon Co. has begun operating a 35,000-ton hydraulic forging press, at North Grafton, Mass., in the Air Force heavy press program . . . The New Haven plans a $64-million railroad improvement program in the next five years.

This Week in Metalworking

Some 7.5 million autos and trucks may be produced in the U.S. this year (p. 53) . . . The iron ore season will begin unusually early this year, probably before Apr. 15 (p. 55) . . . The U.S. is revamping its steel buying procedure (p. 56) . . . American firms will participate heavily in building a new steel plant in Argentina (p. 57) . . . Welding equipment (p. 58) and conveyor sales (p. 59) are rising.



The stainless you need is here

2221 sizes, shapes, finishes and types actually in stock

Here, in the world's largest stainless stocks, the exact steel you need is ready for immediate shipment—in any quantity. That's because Ryerson carries more tonnage in more types, shapes and sizes than any other source. Many requirements are available only at Ryerson. And, all Ryerson stainless is time-tested Allegheny Metal, the quality stainless you can depend upon.

Here experienced steelmen who know your industry's requirements are ready to work with you. And unexcelled specialized facilities are at your disposal for sawing, shearing, flame-cutting or otherwise preparing stainless to your exact specification.

So for every stainless requirement—and for every kind of carbon and alloy steel as well—call Ryerson for quick, dependable service.

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(ACTUAL EXAMPLE)

THE PART

Chrome Plated
Auto Grille Unit

THE STEEL

218,000 lbs. 21" x .036"—Soft Temper, No. 2 Reg. Bright Finish

BLANK SIZE, 21" wide x 36" long

PRINCIPAL OPERATIONS

Blank, Draw, Restrike and Trim
THE JOB-RUN....27175 pieces
THE YIELD.....27055 pieces
THE TIME.....February 1955

JOB PERFORMANCE 99 56/100 %

In citing this one example, we're not saying that DSC STRIP will give you the same near-perfect performance *every time*. We do say that over the long run, our product consistently meets or beats established standards for strip performance.

We invite you to test our 33 years of successful stripmaking experience. We know what our product can be expected to do when the tools, the job and the steel are properly mated.

Let's talk over some of YOUR nearby requirements. Just call your nearest DSC Customer Representative.

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YOUR GUIDE TO DSC MILL PRODUCTS

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Cold Rolled and Hot Rolled Carbon Steel Strip
Cold Rolled High Carbon Spring Steel
Low and Medium Carbon Manufacturers' Wire
High Carbon Specialty Wire
Aluminum Cable Strand Reinforcement
Rope Wire Tire Bead Wire Welded Fabric

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Like our mill people, we in Reliance also work to supply steel that meets your job requirements.

The difference is this. Our mill people *make* the steel to your order. We *pick-your-order* from ready-made sheet and strip. For all practical purposes, the results must be about the same.

How do we meet the test? By getting the facts about the job . . . knowing from experience what the steel on hand can and cannot be expected to do . . . selecting what's best suited for your job in gauge, size, workability and finish.

That's *Job-Fitting*—The Reliance way.

Try us. Call your nearest Reliance Customer Representative whenever we can be useful.

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COLD ROLLED STRIP — Coils Cut Lengths All Tempers
SHEETS — Cold Rolled Hot Rolled Pickled
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Standard or Production Sizes
Sheared or Slit to Actual Working Dimensions

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Operation Cost Cutting

Cost cutting can be one of those will-o'-the-wisp affairs that starts anywhere and ends nowhere.

The editors of this publication decided to reduce the subject to specifics by interviewing men with a broad knowledge of administration, production, engineering and sales.

We wanted to confirm our opinion that industry is more keenly aware of the need for cost cutting than ever before. The confirmation was overwhelming.

We wanted to develop a package of stimulating ideas to pass along to you. The package, containing some of the best thinking in industry, begins on page 93.

Cost cutting involves people, materials and finished products. Its potentials are enormous. It involves explorations all the way from the obvious to the deepest nooks and crannies where waste can go undetected for years.

A cost-cutting program logically starts with the boss. It's his job to set up the program and to instill the belief and necessity for it in the minds of his organization.

Next, there is the need for an outline of the areas where possibilities for cost cutting may exist. It will raise questions like these:

Are employees adequately supervised?
Are they using their time efficiently?
Would some be better suited for other jobs?
Are the materials right for your product?
Can your product be redesigned to save materials and production time?
Have you checked competitive prices lately?
Are you carrying too much inventory?
Is your equipment up to date?
Do you have an incentive system that inspires savings?
Have you thought about a cost-cutting department?

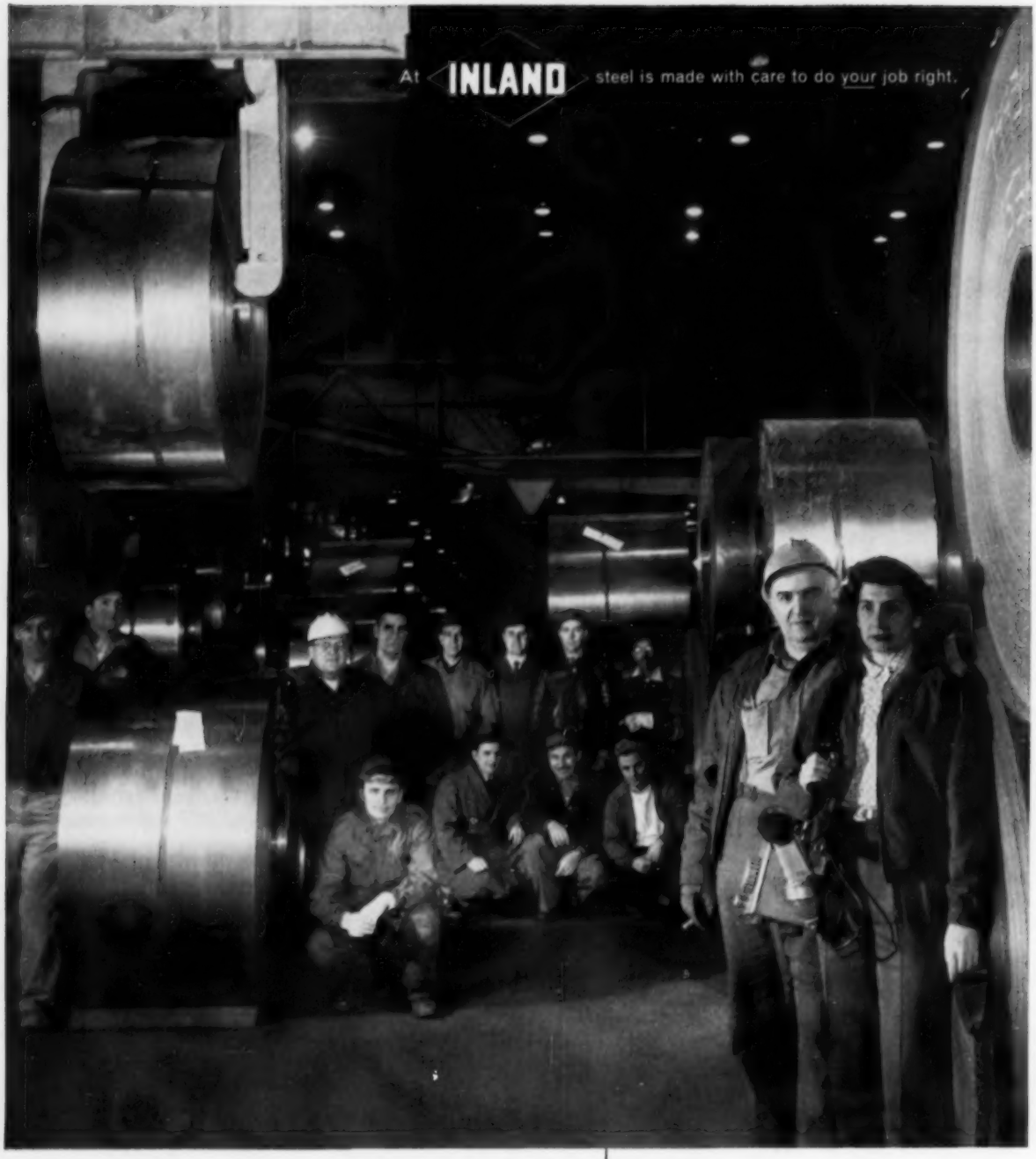
Too often, cost-cutting programs are started when earnings dip and expenses rise. There is the urge to reduce payrolls, trim salaries, cut sales promotion, scrutinize expense accounts and look for wasted paper clips.

Operation cost cutting is not a matter for sudden, indiscriminate action. It should be part of day-to-day organizational planning to make better products at lower cost.

Do you have a permanent cost-cutting program?

Irwin H. Such

EDITOR



THESE INLAND PEOPLE CAN TELL US "NO" (AND FREQUENTLY DO)

The power of veto is delegated to many people at Inland, any one of whom can turn thumbs down on our steel, somewhere along the line, if it isn't right for your job. Take cold rolled sheets, for example. Inland encourages this negative attitude on the part of the individuals in this photo, who are concerned with quality control at various stages of steel production. Their vigilance assures you of uniformly good quality steel, order after order, year after year.

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Principal Products: Sheets • Strip • Structural Shapes • Plates • Bars • Tin Mill Products • Rails and Track Accessories • Coal Chemicals

NEA

'Records daily, weekly, monthly,' says GM's Curtice as . . .

Booming Autos 'Spread the Wealth'

THE BEST YEAR in history—1955 has a chance to be that for the auto industry. If it is, the rest of the economy can be expected to benefit.

General Motors alone claims 21,000 prime suppliers who got 51 per cent of the corporation's $9906 million sales in 1954. Good business in autos can spread a long way.

More Cars—At the start of 1955 the consensus was that about 5.8 million passenger cars would be turned out, plus about 1 million trucks. Now Harlow H. Curtice, GM's president, predicts: "Provided we continue to enjoy labor peace (the automobile industry) may well produce and the domestic market absorb 7.5 million passenger cars and trucks in 1955." That would include about 6.5 million cars, less than a week's production under 1950's all-time record.

Those extra 700,000 cars would be particularly important to metalworking. For example, some 1.2 million more tons of steel would be needed. That would require about 1.2 million tons of iron ore (see p. 55), 600,000 tons of scrap, 1.3 million tons of coal, over 600,000 tons of limestone.

More Jobs—Going further: An extra 200,000 tons of gray iron castings, 35,000 tons of malleable castings, 10,000 tons of aluminum, 8,000 tons of copper and copper alloys, 10,000 tons of lead and alloys, 25,000 tons of zinc and alloys, 2100 tons of chromium.

In a nutshell . . . more jobs, more money in the hands of more people. Figure in additional wear and tear on plant and equipment and you get quite a bundle.

Psychology—Most auto people aren't saying much about Mr. Curtice's prediction. But one commented: "When Curtice makes a prediction like that, there's a tendency for it to come true. Why it is I don't know, but it has a lot to do with psychology. GM is so big that an optimistic note like that tends to echo farther and generate more business optimism than if Colbert (Chrysler) or Nance (Studebaker-Packard) said it."

What makes Mr. Curtice figure that "1955 could be the biggest passenger car year in the history of the automobile industry"? He points to: 1. Widespread public confidence today, "which is in sharp contrast to the caution that prevailed a year ago." 2. Consumer disposable incomes are at record levels. 3. In 1955 the automobile industry has come forward with "the most outstanding products it ever has offered."

Pitching—Other auto companies will be pitching to get their share of sales. George Romney of American Motors Corp. says sales officials are confident of a 25-percent increase in Hudson and Nash

U. S. Production Pass. Cars and Trucks

1955	7,500,000*
1954	6,532,159
1953	7,338,369
1952	5,555,526
1951	6,750,969
1950	8,019,160
1949	6,260,325
1948	5,280,172
1947	4,792,829
1946	3,098,252

Source: Ward's Automotive Reports
*Estimated.

unit sales in the fiscal year ending next Sept. 30.

Studebaker production schedules are at their highest level since early 1952. Packard's programming is the highest in 22 months, but still not high enough to meet demand, says *Ward's Automotive Reports*. Chrysler's production is best since 1950, and might be higher if it were not hampered by supply shortages.

Expansion—Chrysler is clipping off close to the 20 per cent of the market it set as a goal for this year. Its intentions to increase that share are pointed to by the expansion of its engineering facilities. "Particular emphasis is to be placed on greatly enlarged and improved facilities for our styling and body design groups," says James C. Zeder, engineering vice president.

Now, how are the new cars selling? Here's what Detroit says:

Mr. Curtice: "Our dealers are clamoring for cars at a rate faster than we can produce them."

William J. Bird, vice president, sales: "Plymouth is on the way to its greatest year."

R. S. McNamara, vice president and Ford division general manager: "The rapid rate of sales during the traditionally slow winter months has left dealer inventories 50 per cent under what they were a year ago this time and well under what they should be."

Deluxe—Here are some sales trends: Deluxe models in every line are selling the best. This year 75 per cent of engines will be V-8; 60 per cent of the transmissions will be automatic; 30 per cent of cars will have power steering and power brakes. All those figures are up substantially from last year's.

The truck picture is unusually bright. As in autos, new styling, higher power and transmission improvements are in order.

It's generally believed that 4 million autos will be produced by June 30. Less than 3 million will be turned out in the second half —a lot of them 1956 models. The introduction of new models will come fast and furious in October and early November. A few may come as soon as late September.

Depending on no strike, of course.

Salesmen Can Be Costly

HIRING THE WRONG MAN for a sales position can cost a company as much as $20,000, says the American Management Association. The average for 136 firms submitting figures was $6684.

The AMA survey shows that aptitude tests, personality profiles and other new devices of the industrial psychologist have not replaced the interview as a basic method of selecting salesmen. More than four-fifths (mostly manufacturers) of the 180 firms participating in the study state that they place "most reliance" on having several people interview a sales applicant.

Pros and Cons — There is a sharp difference of opinion as to the value of tests. Although tests, whether singly or in combination, are the second most popular device, about 50 per cent of the companies say that they do not use tests of any type.

"We have found that long, careful interviewing by several people, perhaps 10 or 15 at different levels, has given us good results," replied one firm. Another states: "We find that the people who rate best on the tests are our best salesmen." The general feeling leans toward the conclusion that the cost of a test program is not compatible with results.

Methods — Those giving tests generally use these types: Intelligence quotient, personality and adjustment, interests and aptitudes and aptitude and achievement.

The sales department rather than the personnel department shoulders the major responsibility for conducting the sales selection programs in more than two-thirds of the companies surveyed.

Basic Training—At least 75 per cent of the companies have a basic training program for new salesmen. They vary from one week to four years, three months being the average.

Next to an unsatisfactory volume of sales, the weakness encountered by most companies is the failure of sales personnel to plan and organize their time and effort. Almost as frequently mentioned were lack of effort, ambition, aggressiveness and motivation.

"Long, careful interviewing of applicants gives best results"

Lake Ore Shipments

Gross Tons

1955	73,000,000*
1954	60,793,697
1953	95,844,449
1952	74,910,798

*Estimated by STEEL.
Source: Lake Superior Iron Ore Association.

Iron ore freighters will be out before Apr. 15 as . . .

Lake Superior Ore Moves Early

THE 1955 Great Lakes iron ore shipping season will open as soon as ice conditions permit. Most shipping companies expect to be under way by April 15, with some counting on a week or two earlier starting date.

The 59-ship Pittsburgh Steamship Division fleet will open its season Apr. 4, weather permitting.

An early start is indicated this year by unbalanced stockpiles at lower lake blast furnaces. Even though there was a record stockpile of iron ore down last fall (49,868,892 tons as of Dec. 1, 1954), unexpectedly good steelmaking operations are wearing stocks thin in some areas.

Going, Going—Stockpiles of iron ore amounted to 37,470,406 tons on Feb. 1, 1955, according to the Lake Superior Iron Ore Association. With consumption running close to 7 million tons a month, the stockpiles would be down to 16 million tons by May 1 if no more ore were brought down from the Mesabi. So the call is out for early cargoes.

But, over-all, it won't be an exceptionally heavy hauling season at that. Tonnage of Lake Superior ore brought down to lower lake ports probably will not exceed 73 million tons this year. That is better than last year (see the chart above), but well below the peak volume of 95.8 million tons in 1953.

Cross Your Fingers—The 70-million-ton-plus estimate for 1955 is based on all the usual provisos: 1. If there is no crippling automobile strike. 2. If there is no hot war with Russia. 3. If there is no business recession.

One factor which will definitely affect the movement of iron ore down from the Mesabi this year is the import of foreign ores. Major sources in 1954 included Venezuela, Canada and Liberia.

Of Growing Import—Most foreign sources, including those above, expect to increase their shipments to the U.S. in 1955. Venezuela, for example, expects to ship about 8 million tons this year, compared with 5,209,812 tons in 1954 (about 6 million tons to U.S. Steel Corp. and 2 million tons to Bethlehem Steel Corp.). At least 5 million tons of Canadian ore will come to U.S. ports in 1955, compared with 3,536,118 tons in 1954. The Liberian Mining Co., New York, plans to ship 920,000 tons of iron ore to the U.S. this year, mostly to Republic Steel Corp., in contrast to 720,000 tons in 1954.

All that ore will naturally divert some of the demand for Mesabi. While it's not likely to divert enough to reduce the tonnage below last year's traffic, foreign ore will take the edge off any increased demand for Mesabi ore in 1955.

Bethlehem Pacific Coast Steel Corp. readies a defense shipment

U.S. To Revamp Steel Buying

THE DEPARTMENT of Defense currently is pursuing a momentous steel standardization program.

It is anticipated that it will: 1. Make it simpler, easier and faster for the government and its contractors to specify and purchase material from the steel industry. 2. Follow, as closely as possible, commercial procurement practices. 3. Reduce costs by avoiding unnecessary deviations from standard mill practices. 4. Accomplish the foregoing with no sacrifice in necessary quality of product. 5. Increase the efficiency of government inspection practices and procedures.

New Efficiency—The successful accomplishment of these objectives will result in many advantages to the government as a user, and to the steel producing industry. It is estimated that millions of dollars a year are paid needlessly for steel used in military end items because designers fail to specify commercial steels with a minimum of extras.

This program envisions two major steps: 1. Development of a series of steel standards incorporating commercial chemistries, tolerances, test methods and manufacturing practices. 2. Overhauling of current government steel specifications to reflect to a maximum degree the requirements set forth in the steel standards and those extra requirements considered absolutely essential to an intended application.

Published Data—Three important base documents already have been published: 1. Standardization Handbook H-8, "Steel and Iron Wrought Products." 2. Federal Standard No. 48, "Tolerance for Steel and Iron Wrought Products." 3. Federal Standard No. 66, "Steel: Chemical Composition and Hardenability." These documents have been prepared through the joint effort of the Department of Defense and the American Iron & Steel Institute. The Federal Standards were issued by the General Services Administration. Currently under development is a fourth base document, Federal Standard No. 151, "Metals, Test Methods." This standard will supersede the Federal Specification QQ-M-151.

The 17 basic product categories for iron and steel products are: 1. Bars, hot rolled. 2. Bars, cold finished. 3. Bars, concrete reinforcing. 4. Plates, hot rolled. 5. Plates, rolled floor. 6. Plate, short terne. 7. Plate, tin. 8. Semifinished. 9. Shapes, structural. 10. Sheet piling, steel. 11. Sheets, hot rolled. 12. Sheets, cold rolled. 13. Sheets, coated. 14. Strip, hot rolled. 15. Strip, cold rolled. 16. Tubular products. 17. Wire.

In each of the basic product categories considerations are being given to the following types of steel: Carbon, alloy, high strength low alloy, stainless and heat resisting. It should be noted that tool steels, castings and forgings are not covered in this category breakdown.

New Standards — It has been proposed that a basic steel standard for each of the categories be developed which will guide, limit and control governmental designers in their selection of steel.

Because many of the present specifications, as written, cover more than one of the 17 basic steel products in one specification, proponents of the new program feel that a complete overhauling of the steel specification system is necessary.

SBA Totals Up Loans

The Small Business Administration announces the approval of 2257 loans valued at $69,621,369.

The total, covering lending SBA activities from Sept. 29, 1953, through Feb. 15, 1955, includes both business and disaster loans. SBA has approved 1207 business loans totaling $63,539,038, and 1040 disaster loans totaling $6,082,-331.

Argentine Steel Means Business

U.S. firms will help build a plant to have an annual capacity of 500,000 tons of semifinished. Europeans will construct port facilities, coke ovens and open hearths

A NEW STEEL PLANT for Argentina is a sure bet.

Although there was royal confusion last week about just how the financing would be arranged (loan applications had been made to the Export-Import bank by at least three parties), nobody doubted that some sort of loan would be put through.

Under Way—Construction has already started. Some 1000 worker homes and a hotel are already completed at the site, spotted in Argentina's industrial heart on the Parana river at San Nicolas. A French company is building a half-mile long port. Cranes and other modern equipment, purchased in the U. S. and Japan, will handle iron ore and other material.

Maj. Gen. Jose Manuel de Olano, chairman of the operating company (Sociedad Mixta Siderurgia Argentina), told STEEL in Washington that the enterprise is capitalized at 3 billion pesos, or about $250 million. Of this, the Argentine government's share is 80 per cent, with 20 per cent furnished by private parties. As the company becomes established, the government will gradually sell out to the private owners.

Detail — Named the General Manuel Savio Steel Works, the plant's initial annual capacity will be 500,000 tons of semifinished steel. A German firm is building a battery of by-product coke ovens to be ready for operation in the last quarter of 1955. Railroad track has been laid and locomotives and rolling stock ordered from the U. S.

Contract for the first blast furnace has been placed with Arthur G. McKee & Co. This will be operating by March, 1957, and two additional blast furnaces are planned for later on. The power plant will be of 53,000 kilowatts capacity, and will be begun soon. Westinghouse Electric International Co. is interested in this phase.

Plant—Contract for six open-hearth furnaces of 200 tons capacity each is to be placed in Europe. The Czechoslovakian strip mill impounded by the U. S. Treasury and later sold to Argentina for $9 million is to be completed and installed at the plant. The blooming mill and soaking pit are to be bought in the U. S. A combination structural shape and rail mill will probably also come from here.

General Olano declared that some of the semifinished steel production will be sold to other Argentine companies for conversion into finished products. No bar or tube mills are planned. The general estimates that capacity will be enough to meet 25 per cent of his country's steel needs.

Hoffman Organizes Subsidiary

The U. S. Hoffman Machinery Corp. has organized a wholly owned subsidiary to provide sales representation for producers of heavy and medium machinery and materials handling equipment.

It will perform the function of a manufacturer's agent, providing smaller manufacturing firms with a world-wide sales organization. In return, Hoffman expects to realize increased sales potential without expending additional capital.

Oregon Ore Creates Interest

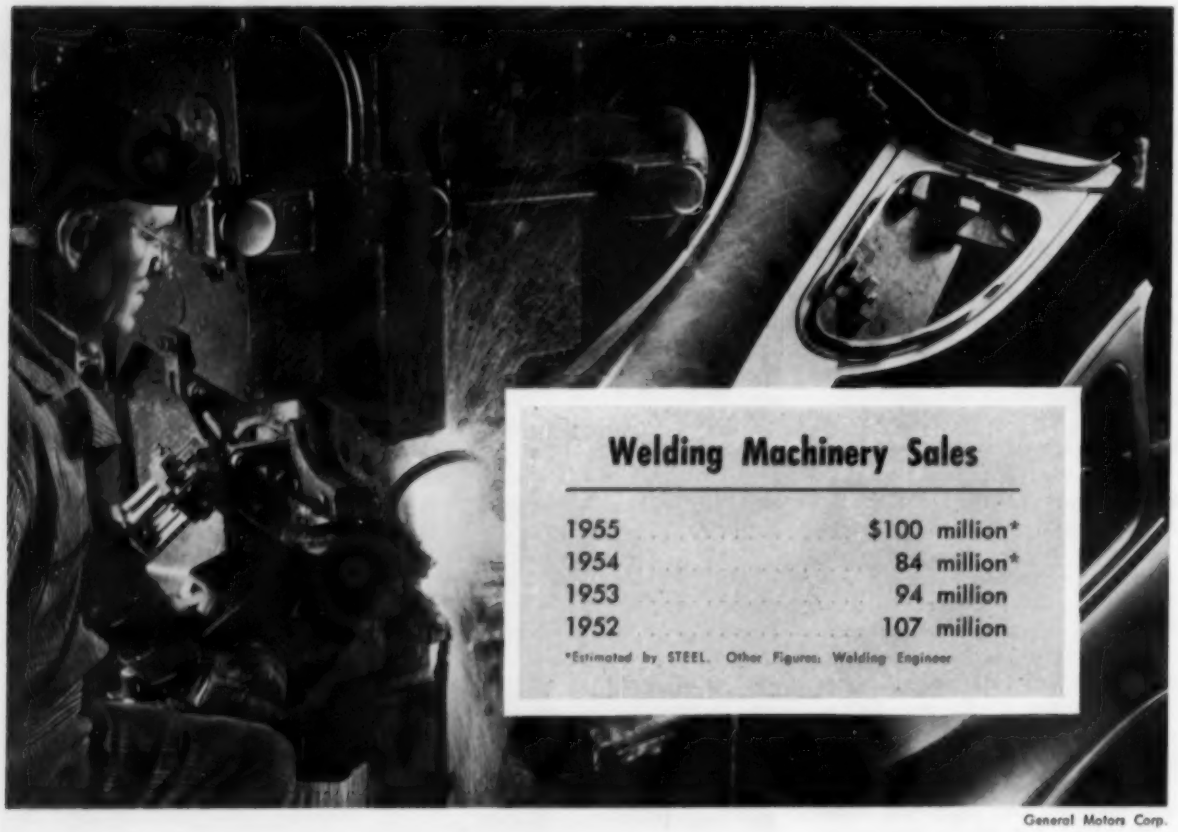
Local ores for local markets—this is the theme of research being carried out near Portland, Oreg., by the Raw Materials Survey Corp., a nonprofit research organization. Immediate attention is focused around the Scappoose iron ore deposits which have been explored from time to time since 1942.

New interest has been created because of the possibility of smelting local ores electrically. The high cost of charcoal and lime have been important factors in preventing the development of local iron ore deposits. In electric furnace smelting, electrical energy is substituted for the portion of the coke used for heating the charge.

The Scappoose iron ore deposits are beds of limonite interlayered with basalt flows. The largest concentration of ores is only 2 miles by road and railroad from the town of Scappoose, Oreg.

Tunnel-Mining Machine Speeds Work

A new tunneling machine is being used in the construction of the Oahe dam, which is part of the Missouri river flood control program. It will mine six flood control tunnels, each 20 ft wide by 3500 ft long. The new machine gnaws at the rate of 6 to 8 ft an hour, an increase of 5 to 6 ft over old methods



Welding Machinery Sales

1955	$100 million*
1954	84 million*
1953	94 million
1952	107 million

*Estimated by STEEL. Other Figures: Welding Engineer

General Motors Corp.

Reviving markets for welding equipment mean . . .

New Life for Old Industry

SPARKED by renewed capital equipment spending, welding machinery sales are turning up after a two-year slide. This year's volume should hit $100 million.

"Our sales performance in 1955 will better 1954's by about 10 per cent," predicts R. W. Raney, general sales manager, Welding Products Division, A. O. Smith Corp., Milwaukee. Other leading makers are betting on gains ranging from 5 to 50 per cent, the median being between 10 and 15 per cent.

Target—By 1970, the consensus is that annual volume will be hitting at least $130 million. Growth factors at work indicate that this estimate is probably quite conservative.

The accent on automation is pushing sales of automatic and semiautomatic machinery. Maurice Sciaky, vice president, Sciaky Bros. Inc., Chicago, comments: "Sales of Sciaky resistance welding equipment were up 50 per cent last year over 1953's."

Methods—And resistance welding isn't the favorite son. Arc welding is rapidly gaining acceptance for high production jobs on heavier metal sections. It's extensively used for making auto frames and axle housings. Gas welding can be used anyplace, and it works well with both light and heavy gage metals. The welding machinery dollar splits roughly into 30 per cent shares each for gas and resistance equipment, 40 per cent for arc welding equipment.

R. O. Wight, advertising manager, Resistance Welder Corp., Bay City, Mich., remarks: "There are few applications where there is any question as to which process should be used." In fact, the field is wide open for each of the three methods to grow without poaching on the others' preserves.

Markets—Lincoln Electric Co., Cleveland, sees a $5 million annual potential in machine tool weldments and structural steel fabrication, pointing out: "By designing structures for welding as much as 30 per cent of the steel is saved." All steel buildings in Texas are being made by welding.

Highway construction, hardfacing, oil industry equipment and aircraft are cited by L. W. Stettner, president, Victor Equipment Co., San Francisco, as some substantial growth markets. Few new metals or alloys are developed or accepted unless weldability is established.

Westinghouse Electric Corp., also looking for 1955 business to be "much better," feels that the inert gas equipment field holds a big growth potential.

Common Problem—The increasing technical complexity of the new processes, reports General Electric Co., demands more attention to application engineering and sales. Most makers feel improved training programs will be needed.

Conveyors: Orders Flow In

MORE AUTOMATION, more roadbuilding, more "keeping up with the Joneses" are the factors that bring more business to conveyor manufacturers.

Modernization of existing facilities by companies who seek to hold their competitive edge by reducing production costs is leading to more integrated production lines. This means greater quantities of conveyor equipment must be purchased. Companies watching their competitors revamp have this choice: Modernize or lose out.

Future Bright — Other markets also brighten the 1955 outlook. Roadbuilding will affect sales of conveyors ranging from those used at concrete and gravel plants to those employed at the scene of road construction. Conveyor equipment sales are also expected to expand in the transportation of bulk materials and people. First quarter results also show that plant expansion and new construction are remaining at a high level.

Mr. R. C. Sollenberger, executive vice president, Conveyor Equipment Manufacturers Association (CEMA) points out that a Bureau of Labor Statistics report shows that the low being paid for labor to handle materials is $1.17 in Dallas. The high is $1.80 in San Francisco. Mr. Sollenberger says: "If you pay a materials handling laborer $1.50 per hour, it will take ten hours and $15 in pay for him to produce a single horsepower. The utility rate for 1 horsepower is about 3 cents. The ratio of horsepower to labor is then 500 to 1." While this is theoretical, it points out one of the reasons for the conveyor industry's optimism.

Forecast — The general feeling of the industry is expressed by E. W. Franz, vice president, May-Fran Engineering Inc: "The business forecast for May-Fran is better in 1955 than it has been at any period in the history of this company. The sales potential is greater; the number of customers is increasing; and the dollar volume is on the rise. An over-all sales increase of 10 per cent is anticipated in 1955."

Total conveyor sales for previous years (see chart) are estimated by CEMA. They do not include cranes, hoists, monorail or farm elevator equipment.

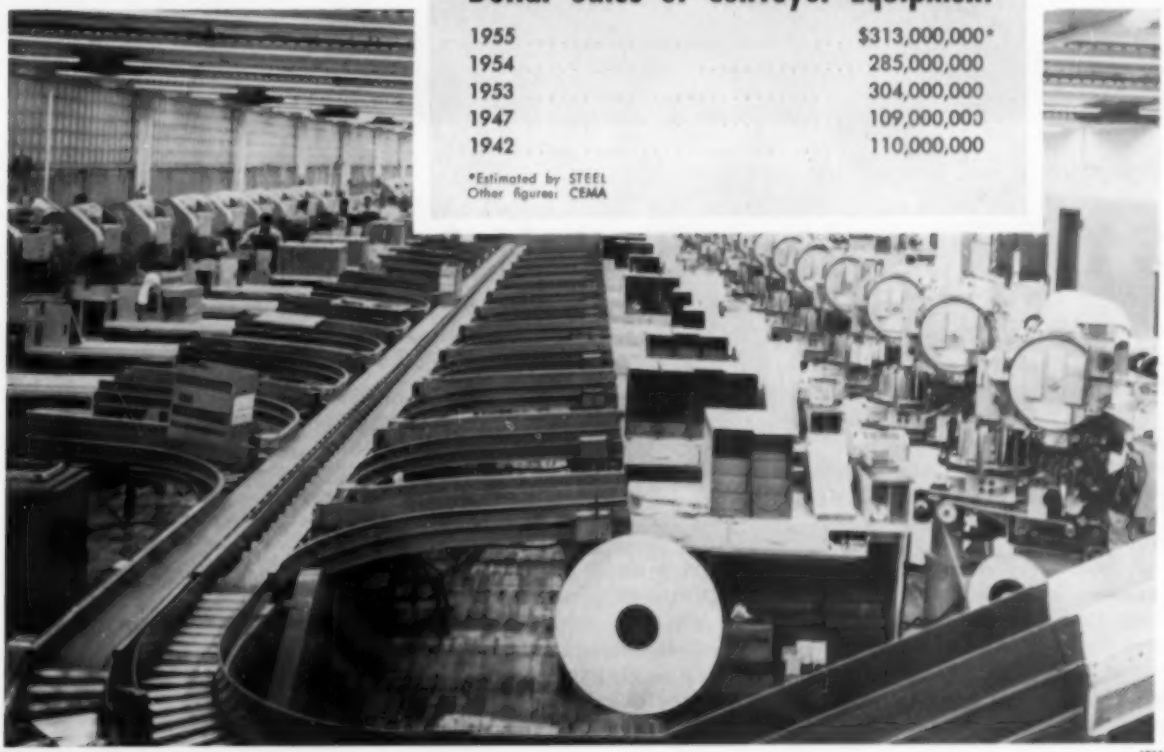
"We feel that our best market for 1955 rests in the modernization of existing facilities," says Mr. J. R. Hersey, assistant sales manager, C. O. Bartlett & Snow Co. "While we may not reach the 1954 peak (a record breaking year for the company) we are anticipating a good year which should be at least the second best in the company's history."

Conveyors are also being introduced to new markets (egg processing for one) because of the development of new types of conveyor belting—canvas, glass fiber, synthetics, woven wire and plain steel band.

Dollar Sales of Conveyor Equipment

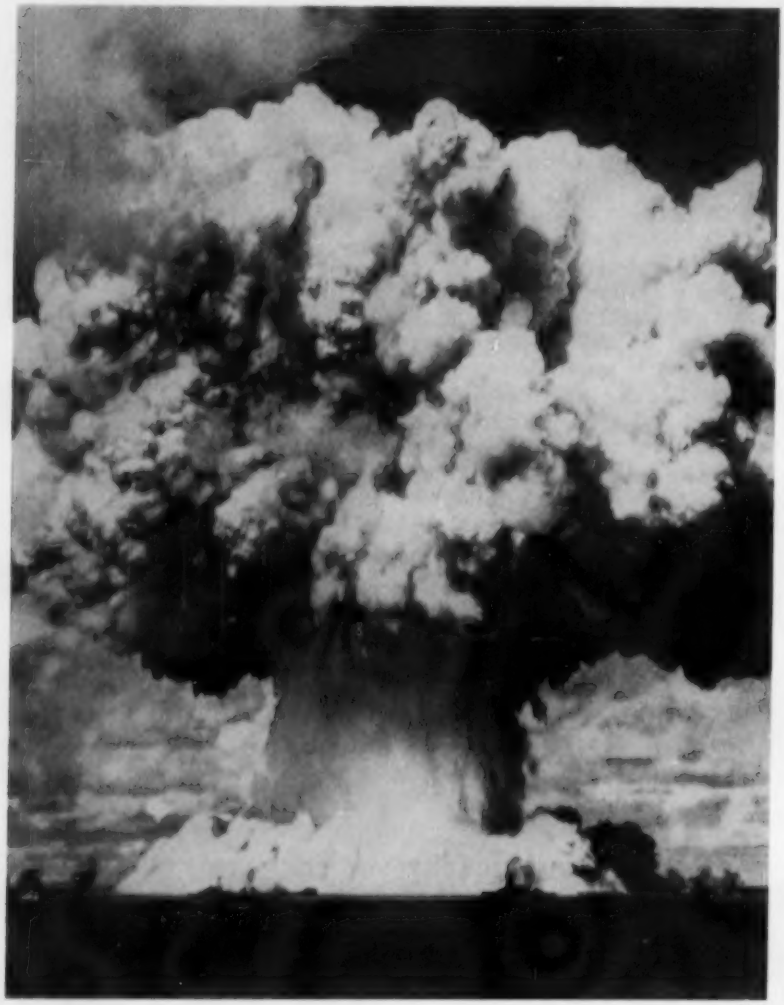
1955	$313,000,000*
1954	285,000,000
1953	304,000,000
1947	109,000,000
1942	110,000,000

*Estimated by STEEL
Other figures: CEMA



IBM

By E. C. KREUTZBERG *Washington Editor*



NEA

New criteria will answer the question . . .

Is Your Plant Site H-Bombable?

WHICH INDUSTRIAL plant locations are relatively safe against the threat of enemy bombing?

That's the $64 question being pondered by industrymen and government officials concerned with plant expansions and fast tax amortization under the Defense Production Act.

Present Measure—The Office of Defense Mobilization currently holds that a new plant must be more than 10 miles from the perimeter of a bombing target that is a big city or congested area to get fast tax write-off. But officials concerned with the problem say that the rule definitely isn't realistic.

The same government officials admit, however, that they do not know precisely how to determine the safe distance.

Cause for Caution—That hesitation to spell out the dispersion rule is nowhere better illustrated than in the case of a new booklet on plant dispersal being readied by ODM. It is complete except for the text on a single page—the one specifying the distance a plant must be from the perimeter of a bomb target to qualify for rapid amortization.

The men studying the problem gave serious consideration to extending the distance from 10 miles to 35 miles. But they ran into impracticality.

Off the Map—For example, a 35-mile rule would prohibit location of new plants in a wide belt south of Cleveland, in almost all of New England and in the manufacturing areas all down the Atlantic coast.

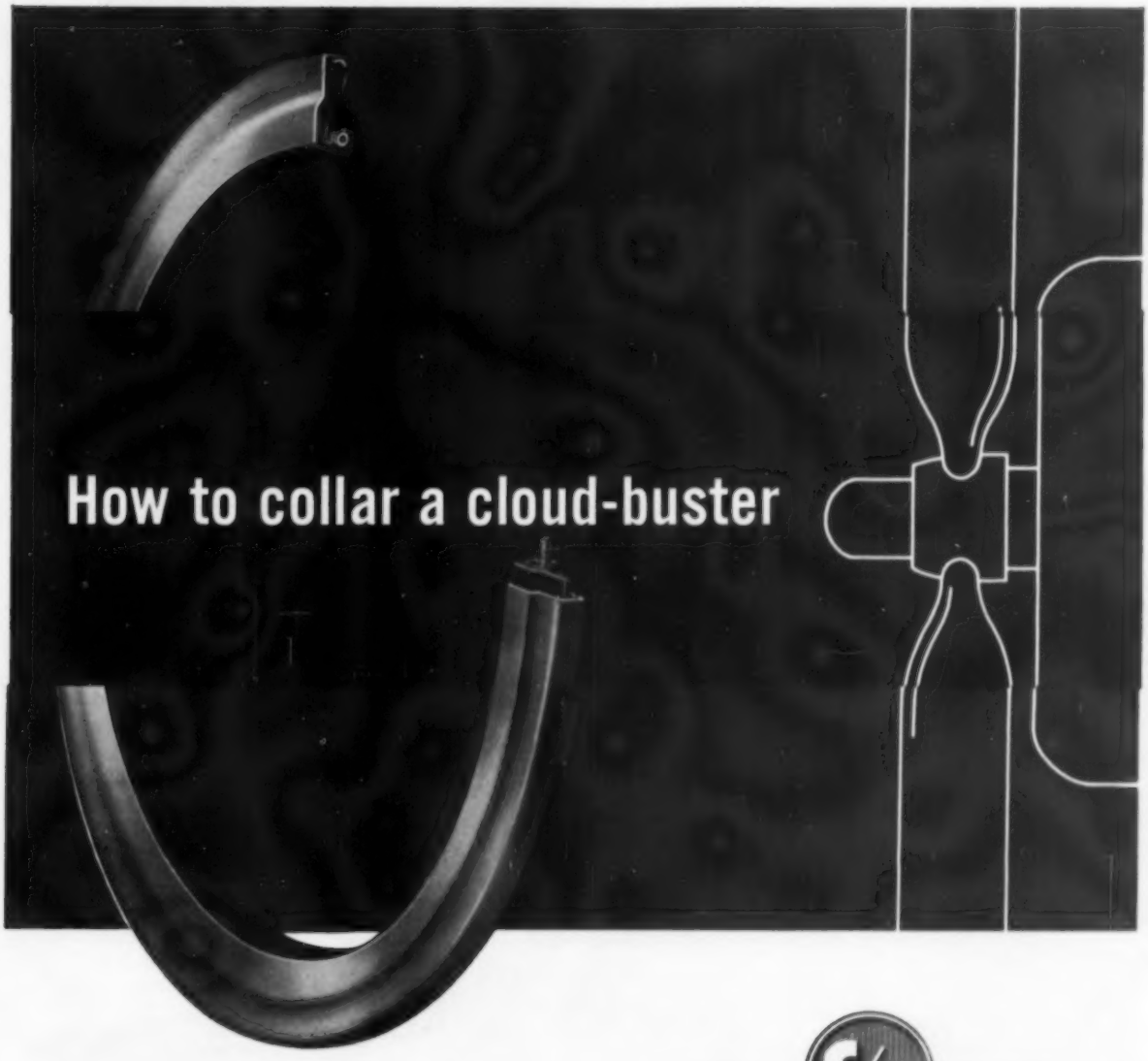
Actually, the fall-out of radioactive dust, the aftermath of thermonuclear bombing, is the big threat. In proportion, direct-hit damage is far less extensive.

Inmeasurable Element — Recent Atomic Energy Commission reports indicate clearly the lethal effects of radioactive fall-out depend on: 1. The strength of the bomb burst. 2. Even more, on the direction and strength of the wind at the time of the explosion. Unfortunately, the winds are changeable. In eastern U.S., for instance, the prevailing winds are from the southwest. But they veer to the west and northwest occasionally.

After the H-bomb test at Bikini in March, 1954, harmful radioactive dust was spewed over a 700-square mile area.

Request—Dr. Arthur S. Flemming, ODM director, has asked Congress to authorize the establishment of a Hoover-type commission to study the subject; the commission should report, he said, by May 15 to permit Congress to enact new legislation at this session. While Dr. Flemming made his recommendation to the Senate Armed Services Committee on Feb. 22, no such legislation has been introduced.

But three agriculturally minded lawmakers have seized the opportunity to introduce bills that would encourage dispersal of new plants to rural areas, with resulting benefits to farmers. Senators Estes Kefauver (Dem., Tenn.) and John J. Sparkman (Dem., Ala.) introduced the measure in the Senate as S. 1199, and Rep. Wright Patman (Dem., Tex.) introduced it in the House as H.R. 4300. The bills were referred to the two committees on agriculture.



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Management at Work

Jackson's Ed DeLaet Wears Four Hats

EDWARD W. DELAET is listed on his firm's organization chart as production control manager. But he also performs three other jobs and sometimes a fifth.

He functions as production control manager, stock control manager, purchasing agent and industrial relations director for Jackson Electrical Instrument Co., Dayton. He also handles public relations work in his spare time.

Spice of Life—"I like the variety," he says. "I worked for a large organization of about 14,000 employees for ten years. But I became bored with the specialization necessary in a business that size." He has "sort of gradually accumulated" his four or five responsibilities in the 30 months he has been with Jackson, a maker of test instruments for radio and television servicemen. The company employs about 100 persons.

Last June he took over the purchasing department, so he is now spending more time there than on his other activities. "But, I'm just about finished with my reorganization there," said Ed DeLaet, "and I soon will be spending about an equal portion of my time on all duties."

The Job—As production control manager, his responsibility is to translate sales predictions into purchase orders and production schedules. "Three of my jobs," he points out, "tie closely together. It makes sense to have one man handle production control, stock control and purchasing." Ed DeLaet's sales forecasting and production planning is done with the aid of the sales manager, comptroller and president. The latter is Paul F. Jackson, who founded the company a little more than 20 years ago.

The firm produces about a dozen different types of test instruments and is now developing a line for testing color TV receivers. The average equipment outlay for a good service man is about $1500. The sum will be considerably more when color comes into its own.

Big Buyer—Jackson's operation is primarily engineering development and assembly, so the purchasing of components is an important task. But Mr. DeLaet buys equipment, too. "We needed a punch press," he recalls. "I knew practically nothing about them, so I had to learn fast to make a good buy. It's the spot job like that which intrigues me."

When 38-year-old Ed DeLaet is not working on purchasing, production control, stock control or industrial relations, he's spending time with his wife and three boys or with his extracurricular job as vice president in charge of programs for the Dayton Chapter of the Society for Advancement of Management, or with a number of other activities.

One of them is square dancing. He and his wife are so good that they even have appeared on television. "I like the variety," he says, "in all those square dancing figures."

U. S. Steel Corp.

You can give away your profit unless you . . .

Weigh Them Right

ACCURATE SCALES can be worth their weight in satisfied customers. Underweight shipments can mean the loss of a customer. Overweight shipments can mean the difference between profit and loss.

A survey by Lamson & Sessions Co., Cleveland, in 1940 revealed that weighing errors at that time could be as high as 3 or 4 per cent. The company knows today that these inaccuracies can be reduced to ½ of 1 per cent.

No Standardization—Initial research showed that one type scale was not the solution to all weighing problems. Weighing machines that had sufficient capacity to weigh large bulky work did not have the desired sensitivity to weigh lightweight products.

After finding the right types of equipment, the company commenced the following procedure which is still in operation: 1. All operators check their scale twice a day, at the start of the shift and after lunch. 2. An inplant expert makes a weekly check of all weighing equipment. 3. An outside firm checks all scales once a month.

One plant alone in the L & S organization may ship 100 tons of fasteners a day. As they are generally packaged in 250-lb containers, scale accuracy is not just desirable, it is a must. Raw materials are also ordered from the running shipment inventory.

Errors—The National Association of Scale Manufacturers Inc. points out that weighing errors stem from ignorance of scale usage, abuse of scales and friction build-up.

A scale is a precision instrument, often built to the same tolerances as a watch. While few people abuse watches, scales are subject to heavy jolting and jarring which can ruin the sensitive mechanisms or at least knock them out of alignment. Scales should also be kept clean and dry.

Another Problem — Friction caused by long usage, abuse and dirt can also cause inaccurate weighing in a variety of unsuspected ways. In general, the scale shows less weight, as it takes more than a given amount of load on the platform or pan to register any amount on the dial. This is caused by resistance to movement.

The disarming feature of scales is that too often owners think that a small error is of no particular importance and that it will adjust itself. Scale errors do not adjust themselves and it is the small repeating error on numerous weighings that adds up to costly totals.

National Screw & Mfg. Co., Cleveland, reports that its standard procedure includes a monthly check by two outside firms. These experts examine all weighing equipment. Each machine is evaluated, and recommendations are made as to what condition each scale is in and how much longer it should be kept "on-line."

Added Importance — Accurate weighing is also an important factor in National's incentive program as well as in production and inventory scheduling and inventory control.

When an order starts through the mill a unit weight is taken to determine the number of pieces produced or processed in various departments. Weighing accuracy is a must. Employees' incentive pay as well as production and inventory control is calculated from the recorded weights. An inaccurate scale can hurt the workers or employer's pocketbook.

No strikes for a machine tool maker in 75 years prove that . . .

Bullard Builds Labor Policy, Too

SEVENTY-FIVE years without labor trouble isn't unique—but it *is* unusual. When it occurs, there has to be a reason.

Usually the reason is wrapped up in a management philosophy which recognizes that the company's employees must be respected to be loyal; that loyalty and mutual prosperity are somehow related. It's this kind of thinking that gives the Bullard Co., Bridgeport, Conn., one of the country's most successful (and perhaps one of its most informal) personnel policies.

The Hub—At the center of this policy, as President E. C. Bullard puts it, is a genuine desire to put the Golden Rule to work. The rest of the program is mere detail.

The key for success, of course, can not be captured in a statement or interpretation of the policy. The secret lies in its day-to-day application.

Starting Point—The first step, Bullard officials say, is in keeping abreast of those employee needs which the company can do something about. This means both meaningful fringe benefits and sound wage plans are musts.

The company participates in a wide variety of surveys (six cover wages alone) to keep up to date and to detect trends.

How Far?—When they spot a new practice or trend, company officials analyze it in terms of its employees' needs—and if it fits, they adopt it.

Sometimes this means going "above and beyond." They extended hospitalization (company paid) to retired workers against the advice of insurance companies. Its cost was only a fraction of what experts predicted. Reason for their decision: "We tried to see what our people needed, and then we found out what the company could do to fill the need."

Grass Roots — The important part of working with employees is to make as much information as possible available to them. J. C. Olson, Bullard's personnel manager, points out the company has tried to decentralize the personnel department. "We count our supervisors, foremen and assistant foremen as extended arms of our department."

They have the responsibility and authority for taking care of an employee's question and are furnished with a manual which states and explains the complete company policy on personnel matters.

Simplified—This makes answers easy to get, helps settle questions and problems fast. The grievance system, for example, does not involve the usual formality or red tape. In the supervisor's manual, the complete statement on grievances reads: "There is no set procedure for handling complaints, only an informal policy of an 'open door.' An employee has recourse first to his foreman and then to such successive higher levels of management as may be necessary for him to receive adequate hearing."

In practice, this sets up no chain of command. All doors, including that of the president, are open to personal problems and complaints. Mr. Bullard instructs his secretary to give any employee with a personal problem an early appointment.

About personal problems, Mr. Bullard advises: "Put yourself in the other man's shoes. Often, you'll find, you'd be as concerned or mad or interested as he is. This viewpoint is a great help in working out problems of this kind."

Returns—How does the policy pay off? Mr. Bullard is quick to point out that you can't measure its success in dollars. One advantage: Harmonious working conditions leave more time, thought and energy to produce machine tools.

Another, Mr. Olson points out: "Perhaps due to the nature of our machine tools, precision engineered and precision made, our help must be skilled. Any steps we can take toward a successful employee relations plan will help keep our men on the job. Our labor turnover is a fraction of the normal for the industry."

A decentralized personnel department is another feature of Bullard's informal industrial relations. As here, a worker can drop in on a personnel man any time

The bumper mount and the 3-legged stool

A case history of interest to any manufacturer who uses flat-rolled steel.

A little piece of steel like that shown above serves as an automobile bumper mount. Originally, this mount was to be projection-welded to the bumper at each of four points. But during the welding process, at the supplying manufacturer's plant, one point of the mount either refused to take the weld, or it broke easily under strain.

Time was running out. Production lagged and costs skyrocketed. And then a Great Lakes Steel Technical Service Representative was called in. He discovered that, regardless of how flat the rectangular mounting might be, it was virtually impossible to get a strong projection weld at all four corners. But when he eliminated one weld, the plate snuggled into the bumper and made perfect contact on three points—just like a three-legged stool! Three welds were actually stronger than four.

Solving problems is a tradition at Great Lakes Steel. As specialists in flat-rolled products, Great Lakes has had to come up with the right answers to problems in many fields. It will pay you to take advantage of this reservoir of experience next time you have a problem that concerns flat-rolled steel.

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Blocks for a Dodge V-8 reconverge after being separated for different bore diameters

'Ambidextrous' Line Builds V-8s

DODGE'S V-8 engine plant has about as much chance for relaxation as a baseball at an orphans' picnic.

Turning out the all-new Red Ram and two versions of the Super Red Ram for Dodge passenger cars, the plant also produces V-8's used in Dodge trucks and Plymouths. Coupled with such dressed-up options as speed kits and power steering, the Dodge engine mill begins to approach the schizoid personality of an assembly plant.

Versatile—But doing the difficult is nothing new at the Dodge V-8 engine plant. Perhaps you recall that to get into operation in 1952, Dodge itself built one-fourth of the machine tools required. Included were the much discussed 159 - foot - long tunnel broach and about 20 more transfer machines on the cylinder block, cylinder head, etc.

Since that time, a second line paralleling the first has been installed. Capacity is now split between the two basic types of engines being produced. On cylinder blocks, the split is between small bore and large bore units, which differ by 1/16-in. In the case of the cylinder heads (which actually determine the "type"), one is the double rockershaft hemispherical-head variety. The other is the single rockershaft "polyspherical" unit.

Engineering—The nature of this split is in itself an interesting bit of engineering. Cylinder blocks, it is reported, may be used with either the single or double rockershaft cylinder head. The polyspherical or hemispherical engine is determined only by which head is installed.

The cylinder head lines also are of considerable interest for their ingenuity. Basic operations on the cylinder heads are fundamentally similar, with the exception of the requirement for profiling the combustion chamber of the hemispherical head. As a result, one line which has produced hemispherical-type cylinder heads is today turning out the polyspherical variety while heads flow by the idled profiling equipment.

Ambidextrous—Also idled in the head line is the valve seat inserting unit, since the polyspherical head is made of an alloy which makes unnecessary the seat insert but requires seat facing. This operation is performed by the equipment which previously counterbored for the insert. The result of all this is a virtual 100 per cent capacity to produce either type head —and, hence, either type engine, depending on the shift of demand patterns.

The most noticeable difference in the block lines is the duplication of the vaunted tunnel broach by two Cincinnati horizontal tunnel broaches in the second line. This is primarily a maintenance matter. Example: If a broach tooth is gouging, 21 blocks would be made before the first bad one emerged from the machine.

Routing—In the line itself, interesting patterns of separation and convergence evolve due to the identity of the blocks (except in bore diameter). For example, they may be run interchangeably through the broaching, drilling and tapping operations. As they split to go through bore boring operations, they are brush marked with an "X" or an "O," depending on which side they are diverted to. They must be visually separated by workmen.

After the blocks have been honed and then sized in an air-condi-

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tioned room, they converge once again to go through the equipment which bores the camshaft and crankshaft bearing lands. Following a short trip through three machining lines, where they are prepared for automatic transmissions, small-bore manual transmissions or large-bore manual transmissions, the engines converge once again and begin their trip down the assembly line which may be operated in any pattern desired.

Test — After assembly, which takes place on pedestal-type floor conveyor fixtures, each engine is cycled through a dynamometer in a room containing 60 such test stands and finishes its journey through paint to assembly or shipping by overhead conveyor. At present, the plant turns out 2400 units daily.

Augmenting the plant will be a new V-8 engine plant announced recently by Plymouth. Capable of turning out 3200 Plymouth engines a day, the plant is expected to be in operation this fall at a facility just being evacuated by defense operation transferal. Formerly operated by Briggs and purchased by Chrysler Corp., the Mound Road plant is already receiving equipment to produce the V-8 engines.

Clean Air—Involved will be two parallel production lines, each over a quarter mile in length and encompassing a total of 157 operations on 70 machines. Ventilation to remove dust and metal particles will be in the base of the machines with a suction capacity of 1500 cu ft of air a minute. They function like a vacuum cleaner to draw dirt downward away from the work area of the machine and carry it off under the floor.

Cylinder heads will be made on four separate lines, each 400 ft long with equipment performing 67 operations. Perhaps most interesting of all are certain reported innovations in automatic engine assembly which have livened industry scuttlebutt here lately, but, as yet, are only hinted at Plymouth.

The finished plant will enclose an area of 530,000 sq ft and represent an investment of almost $50 million in tools and equipment.

Commenting on the new facilities, J. P. Mansfield, Plymouth president, stated: "We are making giant steps forward in the science of quality control, as well as providing the healthiest and safest place in the industry for our employees to work." It is anticipated that volume will be tripled when the new production line gets under way in the late fall.

Exhaust Notes

Two news releases with interesting similarity arrive on the scene this week: "Complete new passenger car registrations for 1954 again show Chevrolet in first place." "Ford car retail sales to customers in 1954 exceeded those of any other make." Raw figures of registrations released by R. L. Polk & Co. contributed the impetus for this numbers racket.

While the sales managers of the "leading" and "nearest competitive make" indulge in paroxysms of modesty, it should be pointed out that neither won by enough to make meaningful claims of "victory."

In a pioneering move, Nash dealers in Detroit are giving away recordings of "The Ballad of Davy Crockett" to folks who test drive the 1955 Nash.

An automotive air cleaner and silencer for carburetors incorporating "conduit tuning" described as "an entirely new principle of sound deadening" is now being manufactured by Houdaille-Hershey Corp. It's adaptable to most car engines without alteration in basic design. The new air cleaner can be wrapped completely around the carburetor with only a minimum of space consumption above the top of the carburetor, permitting lower hood lines. Less restriction also is claimed for the design.

AMA's managing director recently submitted a statement to the House Ways and Means Committee asking for repeal of inequitable automotive excise taxes. The statement pointed out that these taxes originally were invoked during the depression as temporary, emergency levies. The industry stands ready, however, to support a general nondiscriminatory manufacturer's excise tax if required in the interest of sound financial policy.

Auto, Truck Output

U. S. and Canada

	1955	1954
January	780,780†	594,467
February	770,591†	573,801
March		672,485
April		676,248
May		621,262
June		623,732
July		543,540
August		523,799
September		364,441
October		312,078
November		616,395
December		761,954
Total		6,884,202

Week Ended	1955	1954
Feb. 5	190,140	139,042
Feb. 12	191,136	141,570
Feb. 19	198,066	148,257
Feb. 26	195,079	145,980
Mar. 5	193,495	139,263
Mar. 12	195,500*	143,478

Source: Ward's Automotive Reports. †Preliminary. *Estimated by STEEL.

$2.6 Billion for GM Folks

An average of 576,667 men and women worked for General Motors Corp. throughout the world last year. They were paid $2610 million. These figures give eloquent confirmation to Harlow H. Curtice and Alfred P. Sloan's comment: "GM people had a good year in 1954."

Despite a substantial drop in defense employment during the year, hourly-rate employment in GM's U. S. plants was 367,462, compared with 385,929 in 1953. Average hourly earnings of GM's hourly-rate workers in 1954 was $2.27 per hour, compared with $1.81 for all manufacturing.

McLouth Takes Off the Wraps

Detroit auto men are watching with interest the developments at McLouth Steel Corp. Last Friday the company took the wraps off its $7-million installation at Trenton, Mich., to convert molten pig iron into finished steel by use of high-purity oxygen. Production actually began last December.

In operation now for the first time in the U.S., the oxygen process was developed and proven in Austria during the past two years.

Compare! No Other Lift Truck Can Equal the Performance of the New "DOCKER"

	the "DOCKER"	TRUCK A	TRUCK B	TRUCK C
OVERALL LENGTH (LESS FORK)	53⅜"	69¼"	68"	67¾"
STEP HEIGHT	7"	14"	12½"	12½"
LIFT SPEED FPM	65	57	47	60
GRADE CLEARANCE	45%	32%	40%	38%
TURNING RADIUS	55"	60"	64"	61"

Only the "DOCKER" gives you PLUS Performance that is

5 WAYS SUPERIOR

For the trucking industry—and for *all* materials handling where work space is a problem—the new "DOCKER" is the market's top-performing truck! The shortest and most compact truck in its class, it also combines the best grade clearance with the lowest step height. Its lift and travel speeds give the "DOCKER" superior productivity, while its 4-wheel suspension and lower center of gravity provide the maximum stability needed for safe, reliable operation. Investigate the new "DOCKER" today, to discover the greatest efficiency in congested-area materials handling available today!

The "DOCKER" is offered in Mono-lift or Duo-lift... 1,000 to 3,000 lbs.

Automatic

WORLD'S LARGEST EXCLUSIVE BUILDER OF ELECTRIC-DRIVEN INDUSTRIAL TRUCKS

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Please send me, without obligation, full information on the new Automatic "Docker."

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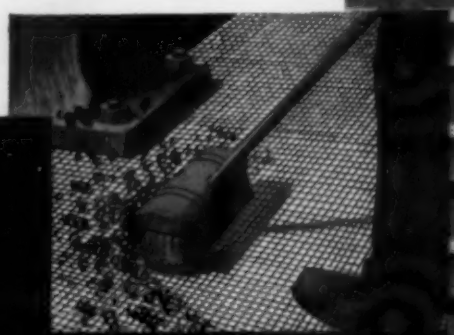
for safe permanent flooring

Jal-Tread floor plate combines the strength and durability of high quality steel in an exclusive checkerboard pattern scientifically designed for *safety*.

Whatever your application . . . in new construction . . . new equipment . . . or replacement jobs, Jal-Tread will assure you of these advantages:

SAFE FOOTING—300 miniature squares per square foot—all of uniform height—provide maximum linear friction surface that protects you against lost time accidents.



EASY CLEANING—Jal-Tread's straight line gutter pattern permits quick, thorough sweeping and draining in any direction.

EASY FABRICATION—Jal-Tread's straight line pattern simplifies welding, flanging, shearing, bending, punching, and drilling operations. Experience shows that Jal-Tread can be cold-formed on standard plate bending machines.

ATTRACTIVE APPEARANCE—Jal-Tread's exclusive checkerboard pattern gives a distinctive, neat appearance in all its applications.

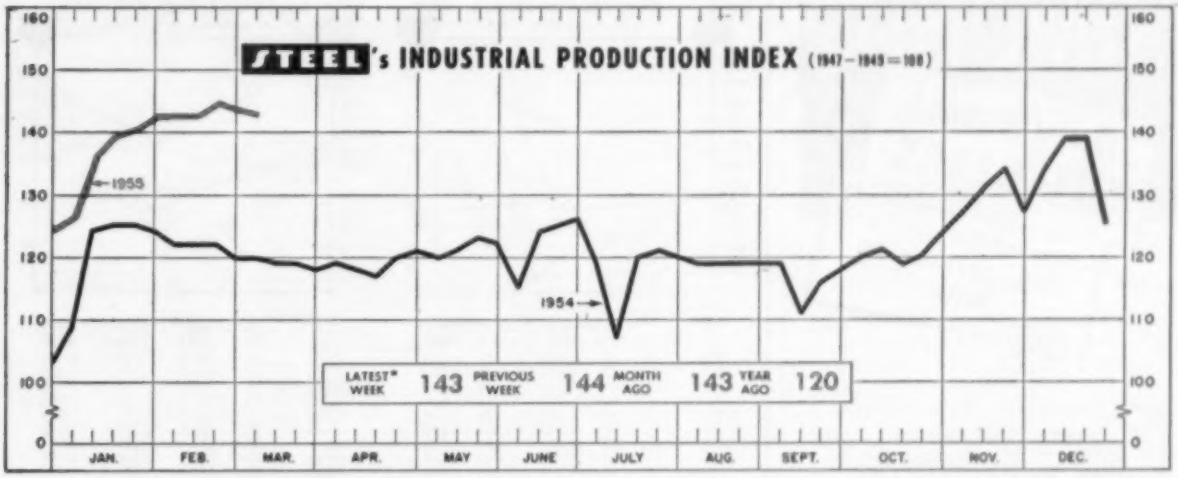
For safe, long-lasting flooring, specify J&L Jal-Tread . . . the only true checkerboard floor plate.

Available at leading distributors everywhere

Jones & Laughlin

STEEL CORPORATION — *Pittsburgh*

J&L STEEL



*Week ended Mar. 5. Based upon and weighted as follows: Steel Output 35%; Electric Power Output 32%; Freight Car Loadings 22%; and Auto Assemblies 11%.

Employment Gains, But Not So Much as Output

EMPLOYMENT is going up, may hit 61.5 million this month. Seasonal factors, if nothing else, point to it. The question is: How much?

One thing worrying many people is that employment is trailing production. Various figures are cited: Production up 5 per cent, employment off 4 per cent from a year ago; output up 7 per cent, employment up only 2 per cent from 1954 lows.

But there are several reasons for this, a situation which seems to leave the worker on the short end of the business upturn.

1. **Inertia.** Through most of the production dip in late 1953 and 1954, the falloff in employment lagged behind the drop in output. Now it's the other way around. That's pretty much the usual course in a business decline and recovery—inertia keeps one factor moving on its same course after the other has turned around. It takes time to catch up.

2. **Increased workweek.** Shops that were on weekly schedules of 35 hours are up above the 40-hour mark; so output rises without a corresponding increase in employment.

3. **GAW.** Auto employment, to name one, might be higher than it is were it not for coming contract negotiations. With a red-hot guaranteed annual wage issue staring it in the face, the industry isn't too interested in taking on workers who may become a burden. The companies would rather pay out overtime now, gambling that they may save money later.

4. **Productivity.** It's up, partly owing to new machines and plants, partly owing to other cost-cutting measures. But automation doesn't come close to being the ogre it's sometimes made out to be.

March is usually a good month for employment. It's when construction and other outdoor activities make inroads on the labor market. Many consumer lines speed up for the usual spring buying surge.

This year, March employment

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	2,198	2,218	1,652
Electric Power Distributed (million kwhr)	9,625[1]	9,725	8,586
Bitum. Coal Output (1000 tons)	8,765	8,690	6,886
Petroleum Production (daily av.—1000 bbl.)	6,775[1]	6,789	6,433
Construction Volume (ENR—millions)	$373.2	$312.2	$208.1
Automobile, Truck Output (Ward's—units)	193,495	195,079	139,263
TRADE			
Freight Car Loadings (unit—1000 cars)	628[1]	635	591
Business Failures (Dun & Bradstreet, no.)	185[1]	178	223
Currency in Circulation (millions)[3]	$29,776	$29,793	$29,885
Dept. Store Sales (changes from year ago)[3]	+2%	+5%	−3%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$20,622	$17,115	$19,562
Federal Gross Debt (billions)	$278.2	$278.3	$274.8
Bond Volume, NYSE (millions)	$22.8	$15.6	$18.5
Stocks Sales, NYSE (thousands of shares)	14,949	11,502	10,141
Loans and Investments (billions)[4]	$84.3	$84.7	$79.7
U. S. Gov't. Obligations Held (billions)[4]	$35.8	$35.1	$32.5
PRICES			
STEEL's Finished Steel Price Index[5]	194.53	194.53	189.74
STEEL's Nonferrous Metal Price Index[6]	227.2	226.8	202.6
All Commodities[7]	110.1	110.3	110.7
Commodities Other Than Farm & Foods[7]	115.3	115.4	114.3

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1955, 2,413,278. 1954, 2,384,549. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-1939=100. [6]1936-1939=100. [7]Bureau of Labor Statistics Index, 1947-1949=100.

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LARGE OR SMALL HEAT TREATED OR PLAIN

SIMONDS has over 60 years' experience in cutting quality industrial gears. We can supply any type of gear in cast or forged steel, gray iron, bronze, Meehanite, rawhide or bakelite in a full range of sizes adaptable to the material. Also heat-treated, case or flame hardened gears of carbon or alloy steel. Send us your requirements for quotation.

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SIMONDS' facilities can produce any type of custom gear from your blanks if you prefer. Same quality . . . same prompt service.

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BEVEL GEARS
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Also stock carrying distributors of Ramsey Silent Chain Drives and Couplings; and industrial V-belts.

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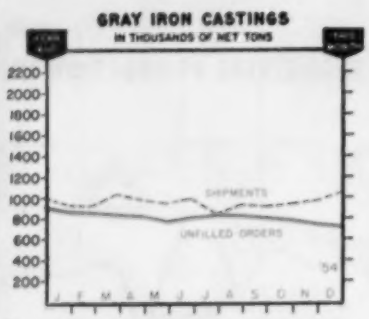
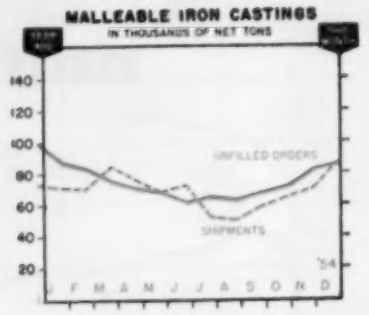
THE BUSINESS TREND



	Shipments 1954	Shipments 1953	Unfilled Orders* 1954	Unfilled Orders* 1953
Jan.	932	1,162	872	1,333
Feb.	936	1,136	865	1,332
Mar.	1,047	1,264	842	1,376
Apr.	995	1,277	826	1,306
May	943	1,186	775	1,272
June	987	1,196	804	1,246
July	821	1,056	829	1,233
Aug.	935	1,069	830	1,223
Sept.	921	1,106	811	1,170
Oct.	942	1,142	789	1,076
Nov.	997	1,004	760	977
Dec.	1,074	1,032	745	955
Total	11,530	13,630		

*For sale. U. S. Bureau of the Census.



	Shipments 1954	Shipments 1953	Unfilled Orders* 1954	Unfilled Orders* 1953
Jan.	70.3	87.6	85.6	174.8
Feb.	69.1	86.8	81.6	175.1
Mar.	84.3	94.8	74.2	177.8
Apr.	74.5	96.3	69.1	174.5
May	67.9	82.3	67.0	160.4
June	72.8	86.8	60.2	151.0
July	50.9	77.4	63.7	137.3
Aug.	59.3	74.1	62.5	120.8
Sept.	58.0	74.6	66.7	114.5
Oct.	64.3	73.7	71.1	104.0
Nov.	70.0	63.7	80.7	93.2
Dec.	87.9	72.4	85.1	98.2
Total	829.3	926.1		

*For sale. U. S. Bureau of the Census.

Charts Copyright 1955 STEEL.

trends bear close watching—particularly in metalworking. For one thing, in good years metalworking employment usually gains in March. A March rise generally continues into summer.

So if employment shows a fair gain, it's a good bet that management is banking on good business ahead. If hiring merely holds its own, it means management isn't sure just how business is going to go through the summer.

Unemployment Claims Slide...

But there's little chance of a drop in over-all employment, even if metalworking does adopt a wait-and-see attitude. For one thing, construction is just itching to get started on record numbers of incoming contracts, plus a backlog from record 1954.

Another clue to the improving labor picture is a drop in initial claims for state unemployment insurance. At the end of last month claims were at a 17-month low, according to the Labor department.

Construction had a good deal to do with the improvement, as did primary metals. In some localities, motor vehicles, electrical machinery and textiles and apparel were important.

Spending Holds Up...

Increasing hours of work are reflected in personal income which was at an annual rate of $290.7 billion in January. That's almost $6 billion higher than it was a year ago, though off slightly from December's $291.4 billion.

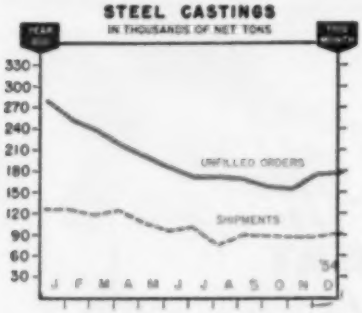
Important in keeping January's figure high are wages and salaries, up $1.2 billion despite post-Christmas layoffs of temporary help. About half the increase was in upswinging durable goods industries. The reason total personal income didn't move above the December level was a drop from that month's unusually high dividend payments.

Good news: Consumers aren't tightfisted when it comes to spending that dough. Department store sales are ahead of last year's and retailers are predicting record Easter sales. Also showing confidence for 1955 is consumer credit. It dropped only $31 million in January, compared with a slide of $351 million a year ago and $188 million in January, 1953.

New Orders Rise...

Autos took a jump up, by $63 million. Repair and modernization loans fell off $42 million and other

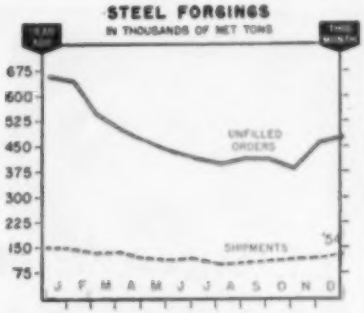
STEEL CASTINGS
IN THOUSANDS OF NET TONS



	Shipments		Unfilled Orders*	
	1954	1953	1954	1953
Jan.	122.8	167.2	251.8	706.5
Feb.	116.5	175.7	234.6	644.3
Mar.	122.3	182.2	214.3	634.6
Apr.	105.8	179.6	197.9	573.6
May	94.6	165.6	182.5	525.0
June	100.0	164.7	169.6	475.8
July	75.8	139.6	170.6	467.9
Aug.	89.6	141.3	168.3	418.9
Sept.	88.4	135.3	156.8	327.2
Oct.	87.1	140.7	154.1	313.7
Nov.	87.7	114.1	175.7	308.5
Dec.	93.5	123.3	179.1	278.0
Total	1,184.1	1,829.3		

*For sale. U. S. Bureau of the Census.

STEEL FORGINGS
IN THOUSANDS OF NET TONS



	Shipments		Unfilled Orders	
	1954	1953	1954	1953
Jan.	139	184	638	1,207
Feb.	127	184	539	1,199
Mar.	130	200	489	1,197
Apr.	116	196	460	1,082
May	107	191	431	1,239
June	113	185	409	1,135
July	97	155	395	1,081
Aug.	102	151	410	974
Sept.	109	153	409	882
Oct.	113	156	382	798
Nov.	120	143	461	740
Dec.	129	143	473	651

U. S. Bureau of the Census. Data based on reports from commercial and captive forge plants with monthly shipments of 50 tons or more.

consumer goods dropped $59 million. A year ago, though, repair loans were off $14 million, other consumer goods off $134 million. Chances are that credit will go up with the thermometer.

Other favorable signs for business include rising new orders for durable goods. Orders for all manufacturing in January were $25.3 billion. In January, 1954, they were only $20.9 billion and in December, $24.7 billion, according to the Commerce department.

The January gain was all in durables. Most ordering is apparently to meet increased business. Though backlogs are mounting, there is still some inventory cutting, but the amount of reduction still going on is rather insignificant in the total picture.

PAs See More Improvement...

Slight changes in those trends are reported by the Purchasing Agents of Chicago in their February survey. Orders are continuing to come in, with 87 per cent reporting backlogs the same or larger than those of a month earlier.

There is some building of inventory to meet the demands of better business. Adding some push to the inventory building are slower deliveries, in turn caused by better business. This is pushing some PAs into longer lead-time buying programs.

The PAs also report slightly higher employment. Production is up (only 8 per cent mentioned dips); and for one-third, business is more profitable than last month.

Trends Fore and Aft...

Capital expenditures may not dip as much as expected in 1955. Many companies report to be readying the largest outlays in their histories. One of the latest: National Cash Register Co. plans to spend $17 million (including $5 million for buildings, $6 million for tools) . . . Another good sign, business loans to metalworking companies are showing more activity . . . Business incorporations in January were 13,181, an all-time monthly record, says Dun & Bradstreet Inc. . . . National Supply Co. expects sales of oil field machinery and equipment will be about the same as the company's second best, 1954. Increases are seen in welded pipe, electrical conduit, industrial products and engines . . . Shipments of metal cans in 1954 were best yet, and 1955 started off even better.

• Edited by GEORGE BLACK

IT COULDN'T BE CAST... BUT IT WAS

You'll be hearing a lot of talk about the jet engine support which foundries had tried to cast in green sand, dry sand, core mold and lost wax. They said it couldn't be cast . . . but they didn't count on that COOPER ALLOY *advanced know-how* which has made the difference in so many cases. It's now a regular production item in our Foundry Products Division . . . in spite of the fact that each piece is custom cast. Shell molding plus experience and the will to tackle the tough ones, did the trick. If you haven't reserved your set of Advanced Know-How case histories which are soon to be published—there's still time. A note on your company letterhead is all you need.

VALVES IN PAPER AND PULP

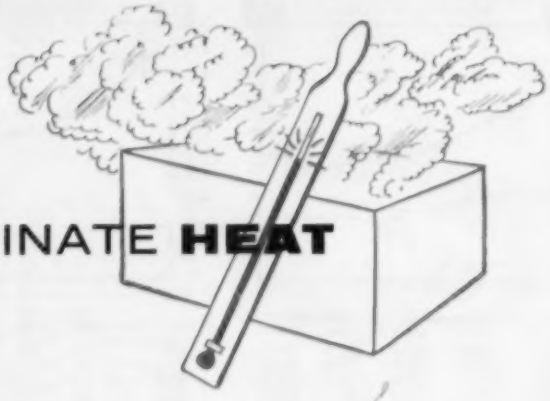
Chief Engineer of Cooper Alloy's Valve and Fitting Division, Perc Shaffer, recently delivered one of the most comprehensive lectures on the subject of stainless steel valves in the pulp and paper industry. It was printed in toto in the Pulp and Paper Magazine of Canada, and is now available in reprint form from our technical librarian.

NEW CHEMICAL PUMP

Vanton Pump & Equipment Corp. has announced a new pump design which combines the basic shelf priming, no stuffing box, no shaft seal features of the standard "flex-i-liner" with a construction that permanently protects all bearings from fumes, or chemical attack. Details of the new XB (external bearings) model, which is available in capacities from fractional to 5 gpm with 0-50 psi descharge pressures, is available on request.

COOPER ALLOY
HILLSIDE, N. J.

NEW HOUGHTON COLD CLEANERS



ELIMINATE **HEAT**

ELIMINATE **FIRE HAZARD**

ELIMINATE **TOXICITY**

Yes, Houghton new cold cleaners make hot, steamy, dangerous metal cleaning processes obsolete!

Whether your metal cleaning requirements call for production line power washers or dip tank methods, there is a Houghton Cold Cleaner to do the job. These new Cold Cleaners not only eliminate the need for costly, uncomfortable heating of cleaning compounds and the dangers of low flash point solvents and toxicity but they do a better, quicker, more thorough cleaning job at less cost!

Take the first step now to modernize and improve your metal cleaning processes. Ask your Houghton Man about these new Cold Cleaners, or write for the new Cold Cleaner bulletin. E. F. Houghton & Co., 303 W. Lehigh Avenue, Philadelphia 33, Pennsylvania.

FROM METAL CLEANING OPERATIONS

HOUGHTO-CLEAN COLD CLEANERS

. . . products of

E. F. HOUGHTON & CO.

PHILADELPHIA · CHICAGO · DETROIT · SAN FRANCISCO

Ready to give you on-the-job service . . .

R. W. HUTCHINSON
. . . *Pacific Switchgear sales mgr.*

D. D. GREENSHIELDS
. . . *joins Pittsburgh Screw & Bolt*

ROBERT F. LAY
. . . *Cooper-Bessemer gen. sales mgr.*

R. W. Hutchinson was made product sales manager for the **Pacific Switchgear Division**, Federal Pacific Electric Co. His offices are at San Francisco.

E. P. Best was made chief metallurgist at the Ambridge, Pa., plant of **A. M. Byers Co.** He is succeeded as assistant chief metallurgist by **E. K. Foss.** Mr. Best replaces **E. B. Story**, recently retired.

William L. Shank was made works manager of **Kearney & Trecker Corp.'s** special machinery division, Milwaukee. For the last five years he was vice president in charge of manufacturing at Ingersoll Milling Machine Co.

D. G. Mitchell, chairman of **Sylvania Electric Products Inc.**, New York, has been elected president of the company. He succeeds the late **H. Ward Zimmer.**

W. R. Manson was made plant manager of **R. D. Werner Co.**, Greenville, Pa. He was chief engineer for the Daystrom Furniture Division at Olean, N. Y. He succeeds **Haskell J. Ross**, who recently resigned.

Burdette M. Baldwin was promoted to general sales manager, **Air-Way Electric Appliance Corp.**, Toledo, O., to succeed **Louis J. Mayer**, resigned.

Effective May 1, **D. D. Greenshields** will be president of **Pittsburgh Screw & Bolt Corp.**, Pittsburgh. He has been with National Screw & Mfg. Co. at Cleveland for 20 years and is resigning as executive vice president and director of that firm. **J. M. Yahres** is president and chairman of the board of Pittsburgh Screw & Bolt. He will continue to serve as chairman after May 1.

New Jersey Zinc Co., New York, elected **Sidney S. Goodwin** as a director, and **Lindsay F. Johnson** as vice president.

Harold T. Henry was elected vice president-sales of **Jersey Shore Steel Co.**, Jersey Shore, Pa.

Kenneth C. Lutz was made New England district manager for **Luria Engineering Co.** at Boston. He was sales representative, eastern district, at New York.

F. J. Stokes Machine Co. Inc., Philadelphia, appointed **J. Gordon Seiter** manager of its newly established high vacuum division, and **G. Jewett Crites** as manager of its vacuum processing division. **John F. Maguire Jr.** joined the company as manager of drum dryer and flaker sales. **Kendrick C. Taylor** was placed in charge of vacuum furnace sales. Mr. Seiter joined Stokes in 1950 to head its vacuum metallizing sales.

Robert F. Lay, assistant general sales manager, was promoted to general sales manager of **Cooper-Bessemer Corp.**, Mt. Vernon, O. He is succeeded by **Grant C. Woodard** as assistant general sales manager.

W. D. Willes, former general manager of Rockwell Mfg. Co.'s **Nordstrom Valve Division** plants at Barberton, O., and Oakland, Calif., was named product manager, Nordstrom Valves, with headquarters at Pittsburgh. He succeeds **Orville W. Barnett**, now manager of Nordstrom distribution and oil fields. The **Delta Power Tool Division** appointed **Thomas C. Mortimer** southern regional sales manager, with headquarters at Atlanta. **Samuel W. Brown** is his successor as woodworking products manager.

Atlantic Polishing Mill, Chicago, appointed **William J. McCaughey** assistant sales manager. He has charge of Midwest sales.

James McMillan was elected president of **Boyer-Campbell Co.**, Detroit, to succeed **William P. Goudie** who enters semiretirement. Mr. Goudie will continue as a director. Mr. McMillan was vice president and treasurer.

Joy Mfg. Co., Pittsburgh, elected **Louis G. Helmick Jr.** vice president of manufacturing. He has

CHARLES M. MERRITT

HOWARD E. ROBINSON

. . . executive changes at Jones & Laughlin

been manager of manufacturing.

Charles M. Merritt, assistant general manager of sales, was promoted to general manager of sales, **Jones & Laughlin Steel Corp.,** Pittsburgh. **Howard E. Robinson,** assistant general manager of sales, was promoted to general manager-product divisions; and **Howard A. Knox,** tin mill products manager, was promoted to manager, sheet and strip products. **Harry R. Johnson** joins J&L as manager, tin mill products. He was with Inland Steel Co. as district sales manager at New York.

R. M. Ditmore joined the executive staff of **Red Seal Metals Co.,** South Gate, Calif. He was previously with the Federated Metals Division of American Smelting & Refining Co. for ten years.

Francis J. O'Brien was named manager of production at the Ambridge, Pa., plant of **National Electric Products Corp.** He was formerly superintendent of the rocket division and head of the department producing Nepcoduct underfloor wiring systems at the Ambridge plant.

Norman B. Kahn was elected vice president and treasurer of **Brown-Strauss Corp.,** Kansas City, Mo. **Norman Strauss** was elected secretary.

B. J. Otis joined the consulting-engineering firm of **Samborn, Steketee & Associates** of Toledo, O., and is in charge of all industrial plant layout for the firm. He formerly was plant engineer for central specialty division, King Seeley Corp.

David E. Neustadt was named general sales manager, **W. W. Sly Mfg. Co.,** Cleveland. Since 1952, he has been vice president-general sales manager of Chas. Rivitz & Co.

At **Heppenstall Co.,** Pittsburgh, **Howard G. Grim,** general manager of operations, was named vice president in charge of manufacturing; and **Irvin E. Walton,** purchasing agent, was named vice president in charge of purchases and traffic.

Herbert A. Osborn was made manager of the new production department of **Worthington Corp.'s** Buffalo Works. **Frank W. Elardo** was named assistant manager.

R. Glenn Gorman was made manager, aircraft division, **Houdaille-Hershey Corp.,** Buffalo. **W. S. Call** was made division sales manager and **Robert E. Marsh** factory manager.

Robert C. Stranahan was promoted to manager of merchandise distribution, metal products division, **Goodyear Tire & Rubber Co.,** Akron.

J. D. Rollins was appointed vice president of engineering at **U. S. Steel Corp.'s** American Bridge Division, Pittsburgh. He has been assistant vice president-engineering for the corporation, and is succeeded in that position by **James W. Kinnear Jr. William E. Crouch Jr.** succeeds Mr. Kinnear as general superintendent of the Edgar Thomson Works, Braddock, Pa.

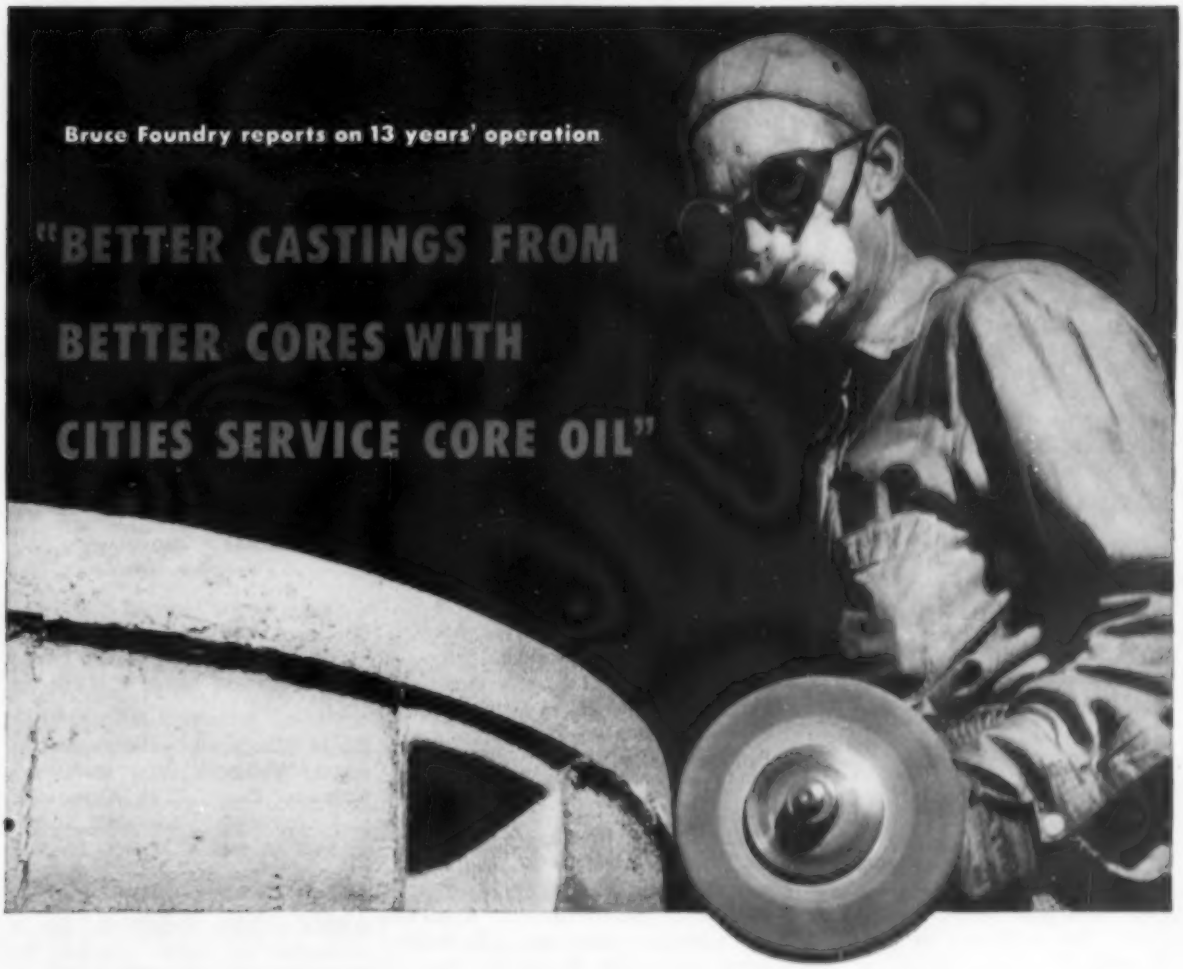
Edward W. Forth was named general superintendent of **DeWalt Inc.,** Lancaster, Pa., to replace **Harold Sneed,** retired. Mr. Forth joined DeWalt in 1953 as assistant plant superintendent.

Superior Machine & Engineering Co., Detroit, elected **William P.**

HOWARD G. GRIM

IRVIN E. WALTON

. . . newly elected vice presidents of Heppenstall



PRESIDENT WILLIAM J. BRUCE is high in praise for Cities Service Core Oil. Says it prevents premature collapsing, eliminates sticking, permits minimum smoke and offers absolute uniformity. Great in every respect.

Located in Tecumseh, Michigan, Bruce Foundry and Mfg. Co. has a melting capacity of 30 to 40 tons per day. For many years Bruce has turned out top-notch castings for refrigeration and automotive hydraulic equipment.

And for thirteen of those years, Cities Service Core Oil has been a major factor in the quality and rapidity of Bruce's work. Probably no one is better qualified to comment on this oil than President William J. Bruce. Here's what he says: "One of the biggest reasons I can think of for recommending Cities Service Core Oil is its absolute uniformity. This we have discovered in every single order for 13 years. As for foundry performance, I don't think there's a better oil. It has high hot strength preventing premature collapsing, yet collapses rapidly at the right time so that sand doesn't have to be dug out of castings. In addition, it eliminates sticking and permits minimum smoke."

If you'd like to learn more about the oil Mr. Bruce praises so highly, talk to a Cities Service Lubrication Engineer. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N.Y.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

AFTER REMOVAL FROM CORE BOX, sand core gets attention from skilled technician at Bruce Foundry. Firm makes castings for automotive and refrigeration hydraulic equipment, has used Cities Service Core Oil for 13 years.

CHARLES A. TAYLOR
. . . Copperweld Steel v. p.

V. LEE COOK
. . . heads Electronics Protection

GEORGE A. GROSSMAN
. . . Barth Corp. sales mgr.

Kramer vice president-sales. Since 1951, he has been Detroit branch manager for National Electric Welding Machine Co.

Charles A. Taylor, in addition to duties of treasurer and controller, was elected vice president of **Copperweld Steel Co.,** Pittsburgh.

Alfred L. Gostow, since 1950 plant manager at the Detroit forge plant of **Dodge Division,** Chrysler Corp., was promoted to manager of methods.

William Wockenfuss, vice president-engineering at Control Instrument Co., **Burroughs Corp.** subsidiary, Brooklyn, N. Y., was named assistant vice president-engineering of the parent company. He continues his position at Control Instrument, as well as offices in the Brooklyn plant.

Russell H. Randolph was appointed manager, Mult-A-Frame Division, **Ainsworth Mfg. Corp.,** Detroit. He was sales manager of the division, and will now direct sales activities as well as manage all Mult-A-Frame operations.

V. Lee Cook was elected president of **Electronics Protection Inc.,** Chicago, a newly formed company. Formerly a division of Continental Communications Inc., Electronics Protection was recently acquired by Allied Structural Steel Cos. Other officers of the new company are: **Charles F. Jarrard, Jerome D. Gage** and **George E. Wilson,** vice presidents; **William J. Kearney,** treasurer; and **Robert E. Samuels,** secretary. Partner firms in Allied Structural Steel Cos. are Clinton Bridge Corp., Gage Structural Steel Corp. and Midland Structural Steel Corp. Mr. Cook continues to serve as president of Continental Communications.

Ronald F. St. Martin joined **W. C. Twigg Industries Inc.,** Brazil, Ind., as industrial engineer.

Robert E. Bader was elected executive vice president of **Emil Greiner Co.,** New York.

Melvin R. Schuster was appointed market supervisor for the sign industry, a new position with **Aluminum Co. of America,** Pittsburgh.

George A. Grossman was appointed sales manager of **Barth Corp.,** Cleveland. He joined the firm in 1954.

E. N. Rousseau, sales manager, metals division, **Olin Mathieson Chemical Corp.,** East Alton, Ill., was promoted to the staff of the general manager, where he will be available for special assignments pertaining to any phase of metals division operations. He is succeeded as sales manager by **E. W. Sherman,** former assistant sales manager.

Barium Steel Corp., New York, appointed **John J. Selway** general manager of its subsidiary, Chester Blast Furnace Inc. **Wade H. Oldham,** former general manager, continues with the company as vice president.

Mercast Corp., New York, appointed **William A. Damerel** a vice president and **Dr. Fred Schulman** as assistant director of research. Mr. Damerel was formerly works manager of American Bosch Co. Dr. Schulman was technical director for Herrick L. Johnston Inc.

OBITUARIES . . .

George W. Avildsen, 64, executive vice president and co-founder of **Avildsen Tools & Machines Inc.,** Chicago, died Feb. 24.

R. B. Reilly, 51, southwestern regional engineer of **American Institute of Steel Construction,** New York, died in an airliner crash Feb. 19.

Brainerd Dyer, vice president, **Vitreous Steel Products Co.,** Cleveland, died Mar. 6.

Charles T. Binks, 67, vice president, **Mooney Iron Works Co.,** Cleveland, died Mar. 5.

Raymond Deutsch, 72, president of **Monarch Aluminum Mfg. Co.,** Cleveland, died Feb. 27 in Boca Raton, Fla.

F. Clayton Terry, 77, for many years vice president and district manager at Cleveland for **Denton & Anderson Co.,** died Mar. 2.

USG PRODUCTS IMPROVE STEEL MAKING FROM CHARGE TO FINISHED INGOT

The United States Graphite Company has served the steel industry for a half century with products to improve steel making from the furnace to the finished ingot. Our engineering service and laboratories are constantly working on new products to solve your steel production problems. The products listed here are a few of the most popular and widely used — why not investigate them — they can cut your costs.

RECARB-X®

(engineering bulletin #11)

insures carbon specifications

RECARB-X is ideal for off-carbon heats. A fifty pound bag per 100-tons of steel will raise carbon two points when added to the ladle. RECARB-X dissolves quietly, gives uniform, dependable carbon recovery at all carbon levels. There are grades of RECARB-X for the furnace charge.

MEXICAN® MOLD WASHES

(engineering bulletin #15)

for better ingot surfaces

For as little as ¾c per ingot ton, you can insure quicker, easier mold stripping with MEXICAN Ingot Mold Washes. MEX and 90-B can be applied at any temperature and are easy to prepare and use. Where a high volatile "gas kick" is needed, VOLMEX or XF-81 will supply the answer. For an inert, non-carbonaceous mineral coating, XF-88 will do the iob.

MEXATOP®

(engineering bulletin #5)

gives sounder ingots

MEXATOP is a powder compound which spreads easily over molten ingot heads and casting risers. A ⅜" layer over the molten surface works effectively to prevent cavitation and insure sounder castings.

Write for Engineering Bulletins describing these products.

196

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AIDS

or
RECORDING
HEADS

or *ANY* MAGNETIC MATERIALS JOB . . .

Write for your Copy
"MAGNETIC MATERIALS"

This 32-page book contains valuable data on all Allegheny Ludlum magnetic materials, silicon steels and special electrical alloys. Illustrated in full color, includes essential information on properties, characteristics, applications, etc. Your copy gladly sent free.

ADDRESS DEPT. S-63

You can *rely* on core materials like the Allegheny 4750 components illustrated above, in your receivers, recording heads or microphone assemblies.

In fact, whether your equipment is small or large, the extra-broad line of A-L magnetic materials will solve your magnetic core problems. It includes all grades of silicon steel sheets or coil strip, as well as Allegheny Silectron (grain-oriented silicon steel), and a wide selection of high-permeability alloys such as 4750, Mumetal, Permendur, etc.

Our service on these materials also includes complete facilities for the fabrication and heat treatment of laminations. (For users of electrical sheets and strip, our lamination know-how is a real bonus value!) Either way, we'll welcome the chance to serve you. *Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa.*

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Allegheny Ludlum

WAD 5335

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STEELS FOR THE ELECTRONIC AGE

Metal Producers To Merge

Illinois Zinc plans to buy Canadian Javelin Ltd. and Boon-Strachan Co.

ILLINOIS ZINC CO., New York, will merge with Canadian Javelin Ltd. and Boon-Strachan Co. Ltd., Montreal, Que., subject to approval by stockholders.

The firm's name will become Illinois International Iron & Zinc Corp., with the Boon-Strachan organization acting as the operating and sales organization in the new setup. John C. Doyle, chairman of the Canadian companies, is slated to become chairman of the board of Illinois International; Morris Blumberg, chairman of Illinois Zinc, will be president.

Physical properties of the companies extend across the Western Hemisphere, from Labrador through Quebec, Illinois, New Mexico, Arizona to Chile in South America.

Ore Property — Canadian Javelin's best known asset is the Lake Wabush iron ore deposit in Labrador, estimated to contain over 1 billion tons of shipping ore of 65 per cent iron. The ore occurs in a single open pit deposit. The company recently purchased an additional 2400 square miles of mining concessions adjacent to the 2300-square-mile concession on which the Wabush deposit is located.

Other Canadian Javelin assets include a titanium property in Quebec, a foundry near Montreal and producing mining companies in Chile. The titanium deposit contains 30 million tons of proved commercial ore. The Beaver foundry at Joliette, Que., has been in operation since 1850. The Chilean assets comprise four operating lump ore companies and other mining properties. Agreements have been made to market this ore in the United States and Europe.

Illinois Zinc owns and operates a zinc strip rolling mill in Chicago; a sheet mill in Peru, Ill., which produces lithographic plates; a 1250-ton zinc concentrating plant at Deming, N. Mex.; and fully equipped zinc mines in the same state. The company is readying for production the Shannon mine at Gleason, Ariz., from which production of high-grade lead, zinc and copper is anticipated.

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T-J Spacemaker Cylinders get first call for an ever-widening range of power movement jobs in industry today—because they're so advanced in design . . . so efficient and dependable in performance. Wide selection of styles and capacities. Check your needs now! Send for bulletin SM-454-2. The Tomkins-Johnson Co. Jackson, Mich.

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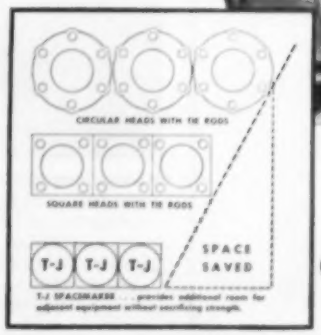
Turn	Drill
Grind	Sequence
Weld	Close
Lower	Snub
Squeeze	Form
Bend	Pierce
Coin	Feed
Saw	Mill
Tap	Convey
Index	etc.
Brake	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SPACE SAVED
T-J SPACEMAKERS . . . provides additional room for adjacent equipment without sacrificing strength.

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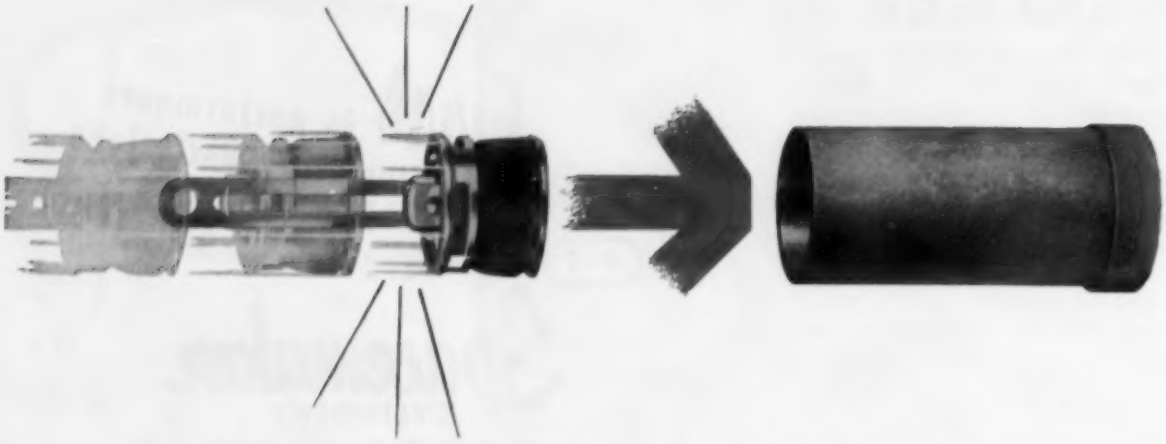
DIVITORS AIR AND HYDRAULIC CYLINDERS CUTTERS CLINCHERS



How to soak up shock and

Underwood Corporation did it by using Republic ELECTRUNITE Stainless Steel Tubing

This was the problem: find a material for the cylinder in the carriage shock absorber on an accounting machine. The cylinder must have an accurate bore, little variation in diameter, and negligible eccentricity. It must also have a suitable finish to reduce drag, because the piston which fits inside must be completely retracted in less than a tenth of a second.

Republic metallurgists suggested ELECTRUNITE Stainless Steel Tubing. It was drawn to meet dimensional requirements. The finish was excellent. And Underwood reports good service life because of excellent wearing qualities.

Republic Steel Corporation
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- ☐ ELECTRUNITE® Stainless Steel Tubing and Pipe
- ☐ Republic Nuts and Bolts
- ☐ Republic Chateaugay Pig Iron

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Company_____

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BUSINESS MACHINE PARTS COST LESS because they last longer when they're made of Republic Enduro Stainless Steel. On this Addressograph-Multigraph office machine, ink corroded the carbon spring steel from which the ribbon guards and lister spacing bands were made originally. Carbon steel also cracked under the operating strain. Enduro Stainless Steel resists this corrosion, has the necessary springiness and wears well, despite the abrasive action of moving the ribbon.

cut costs!

Underwood now saves 75 cents on material costs for each shock absorber.

This is only one of many customers for whom Republic has saved money. Sometimes we save material costs. Sometimes production costs. Often, both. And since we manufacture both stainless steel and carbon steel tubing in many analyses, we are equipped to help solve all kinds of tubing problems.

Fill out the coupon below for more facts on Republic ELECTRUNITE Mechanical Tubing. Or call your nearest Republic district sales office.

ECONOMICAL MACHINING IS ONLY ONE REASON why a leading maker of heat-resistant glass products uses Republic Chateaugay Pig Iron for glass molds. This premium pig iron, supplied exclusively by Republic, also assures a dense, fine grain structure; longer mold life; fast-flowing and even-cooling characteristics. Hard surfaces resist heat and wear.

CUTTING COSTS ALSO APPLIES TO BUYING FASTENERS for your assembly and maintenance work. One call to your Republic Distributor gets all the fasteners you need. There's no shopping around, no time lost. Paper work is reduced. And, you get exactly what you want because Republic makes and stocks over 20,000 types and sizes of regular fasteners, everything from machine bolts to sheet metal screws. You can depend on Republic Fasteners for quality, uniformity, ease of application, long service life. Quick delivery, too.

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

No. 2* of . . .

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HOMESTEAD
Lubricated
PLUG VALVES
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HOMESTEAD'S EXCLUSIVE, COMPLETELY CONTROLLED HIGH-PRESSURE LUBRICANT SYSTEM

. . . forces chemical seal over all seating surfaces; prevents any possibility of sticking by momentary piston-like action of plug which is moved downward and returned instantly against packing ring. Provides 100% seal around ports; guarantees a completely filled system.

This is only **ONE REASON WHY** you should buy and use, *low priced* **HOMESTEAD LUBRICATED PLUG VALVES.**

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1. Reinforced Teflon packing ring.
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3. 100% pipe area and venturi patterns.
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6. Two lubricants handle most services.
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Auto Firms Decentralizing

Chrysler will build plant in Indiana; GM, in Kansas; and Ford, in Ohio

DECENTRALIZATION of plants by leading automobile manufacturers continues unabated. Chrysler Corp. will build a huge plant on the outskirts of Kokomo, Ind., for the manufacture of automatic transmissions; General Motors Corp. will build a plant at Olathe, Kans., for the manufacture of automotive storage batteries; and Ford will build a parts manufacturing plant near Sandusky, O.

The new Kokomo facility will virtually double Chrysler's automatic transmission capacity. Construction of the 800,000-sq-ft plant will be started as early as possible this spring, with the building scheduled for completion next fall.

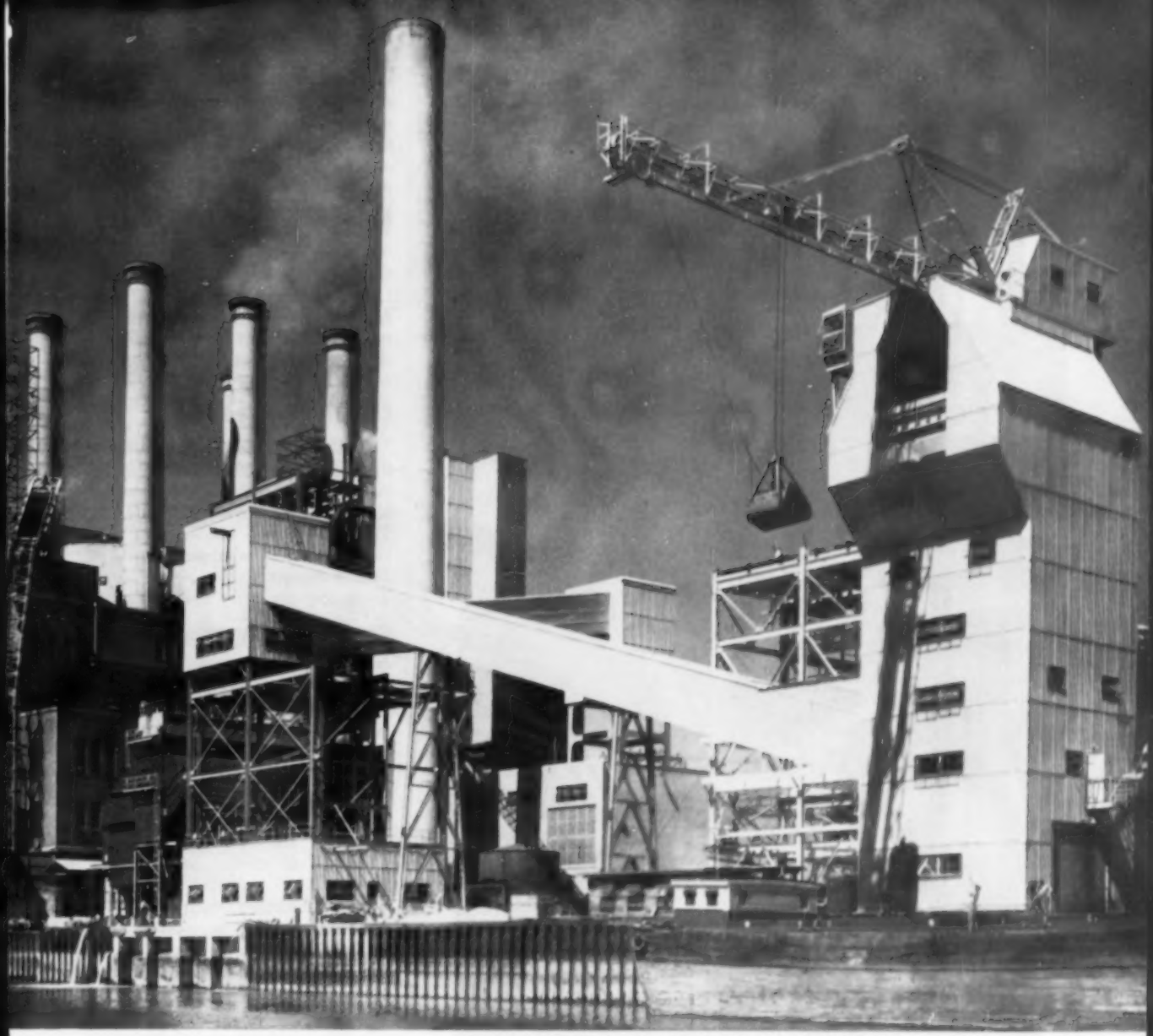
Currently, Chrysler is building automatic transmissions in a new 750,000-sq-ft plant at Indianapolis and is producing standard transmissions at another plant at Kokomo.

Construction of the General Motors' plant is expected to get under way during May, with production facilities to be completed in the spring of 1956. It will be the fourth unit of Delco-Remy Division's Delco battery operations. The others are in Muncie, Ind.; New Brunswick, N. J.; and Anaheim, Calif. The division's home office is in Anderson, Ind., where it operates ten plants devoted to the manufacture of automotive generators, starting motors, distributors and other items of electrical equipment.

The automotive parts plant which Ford plans to build near Sandusky, O., will contain 600,000 sq ft. It will be a component of the firm's Parts & Equipment Mfg. Division which maintains its headquarters at Ypsilanti, Mich. It is headed by John S. French, general manager. Construction work is scheduled to begin late this spring. Completion is expected by mid-1956.

Simonds Builds Oregon Plant

Simonds Saw & Steel Co., Fitchburg, Mass., is building a plant in Portland, Oreg., to replace present facilities in that city. The struc-



EASY PICKUP describes job done by powerful Clyde Unloader. Standing 100 feet high with lifting range of 100 feet, this Clyde giant is rated at 300 tons per hour.

New steel stevedore unloads 5 tons of coal every minute!

This giant new Unloader was built for the Long Island Lighting Company's new Glenwood Station by Barium's Clyde Iron Works in Duluth, Minn.

Since this recent installation, the Clyde Unloader has outsold all other makes in its size and capacity — on the strength of its modern design and unusual efficiency.

It's the latest in the string of solid achievements which stud the 10-year growth record of the Barium team — from a single company in 1944 to 16 integrated companies today. Key factor in this steady progress is Barium's exceptionally broad base, clearly evident in the listing of its affiliates at right. This unique diversification — ranging from aircraft to steel — enables Barium to take on the toughest manufacturing and fabricating jobs and deliver the goods when, where and how you want them.

Take it from companies like Long Island Lighting — it pays to deal with Barium. If you'd like to know more about us and what our family of companies are doing, write today for a copy of The Barium Story. Barium Steel Corporation, 25 Broad Street, New York 4, N.Y.

16 INTEGRATED COMPANIES

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WORKING IN STEEL, ALUMINUM, MAGNESIUM, FIBERGLASS

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Steel Fabricators & Processors

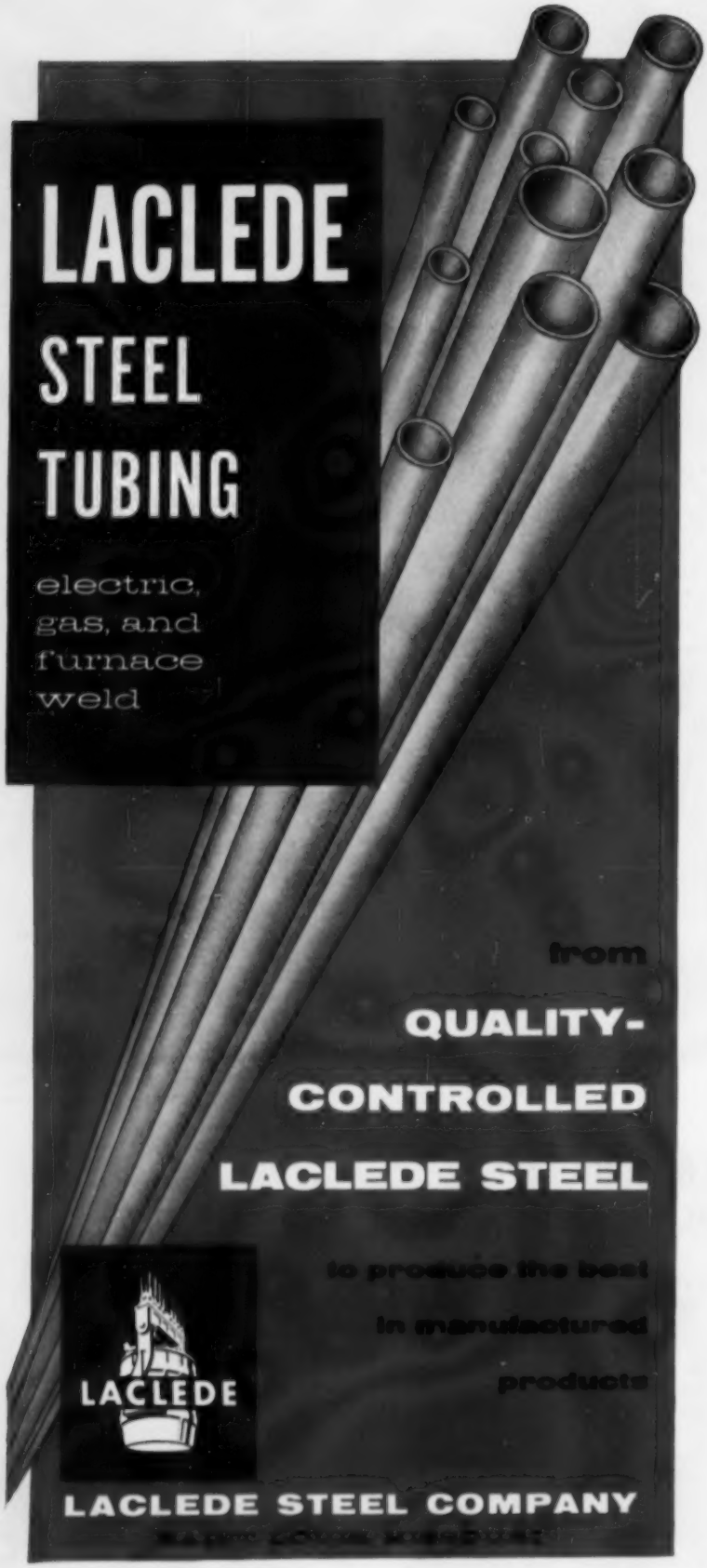
Phoenix Bridge Co. • Industrial Forge & Steel, Inc. • Globe Forge, Incorporated • Geometric Stamping Co.

Manufacturers of End Products

Clyde Iron Works, Inc. • Erie Bolt and Nut Company • Bayonne Bolt Corp. • Cuyahoga Spring Company • Jacobs Aircraft Engine Co. • Kermath Manufacturing Company • Kermath Limited (Canada) • Wiley Manufacturing Co.

Lightweight Metal and Plastics 5.1

East Coast Aeronautics, Inc.



ture will contain 60,000 sq ft of floor space. The company makes cutting tools, grinding wheels and abrasive products and operates an electric furnace steel mill.

Kaiser Buys Union Steel Co.

Kaiser Steel Corp., Oakland, Calif., purchased Union Steel Co., Los Angeles. Union Steel fabricates plate and structural shapes, truck tanks and equipment and specialty steel items.

C&O To Build Ore Pier

Chesapeake & Ohio Railway, Cleveland, will build a bulk materials unloading facility at Newport News, Va., at a cost of $8,307,000. The facility will unload bulk materials, such as ores, at the rate of 1 ton a second.

Panellit Inc. Expanding

Panellit Inc., Chicago, purchased Jordan Electronic Mfg. Co. Inc., Pasadena, Calif., manufacturer of automatic control and data reduction information systems. Panellit plans to accelerate Jordan's research and development activities in the field of industrial measurements in addition to its work in the nuclear field. Jordan Electronic will be operated as a wholly owned subsidiary, with M. Jordan Nathason serving as president and Albert Sperry as chairman of the board. Panellit is building a manufacturing plant at Alhambra, Calif., to be occupied by the firm's Western Division and Jordan.

J&L Forms New Divisions

Jones & Laughlin Steel Corp., Pittsburgh, is operating the recently acquired firm of W. J. Holliday & Co. Inc., engaged in the steel warehouse business in Indianapolis and Hammond, Ind., as the W. J. Holliday & Co. Division. Holliday's affiliate firm, Monarch Steel Co., Hammond, producer of cold-drawn bars, becomes J & L's Monarch Steel Division.

C. H. Bradley, president of W. J. Holliday & Co. Inc. and of Monarch, becomes chairman of the advisory board of W. J. Holliday & Co. Division. G. L. Stewart, vice president and general manager of

the former Holliday firm and executive vice president of Monarch Steel, becomes president of the Holliday division and general manager of J&L's Warehouse Division, which operates ten warehouses in as many cities. R. W. Burton, former manager of general services of J&L's Warehouse Division, is assistant general manager of the division.

Jennings Lambeth, manager of Holliday's Hammond warehouse, is vice president of sales for the W. J. Holliday & Co. Division. D. L. Ande is manager of J&L's Detroit warehouse. L. S. Roehm is consultant to the manager of the Detroit warehouse.

Kropp Forge Completes Project

Kropp Forge Co., Chicago, completed a $6-million improvement and expansion program, providing new facilities for all phases of forging, including the production of larger and more complex units for Army aircraft parts. New equipment includes two 50,000-lb drop forge hammers, two 2750-ton presses, six newly designed lithium atmospheric controlled furnaces, a large hydraulic forging press and other auxiliary equipment. The facilities will be used primarily for the forging of difficult-to-forge materials, such as titanium, stainless steel and heat resisting alloys.

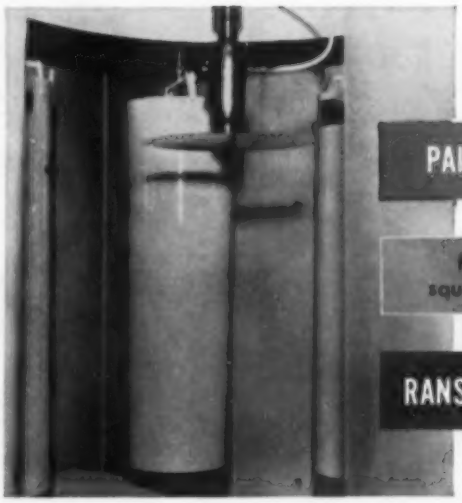
CF&I Enlarges Buffalo Plant

Colorado Fuel & Iron Corp., New York, will spend "several million" dollars to rehabilitate its Wickwire Spencer Steel Division in Buffalo. The division's four steelmaking furnaces will be made larger and more efficient. Capacity of the wire mill will be doubled and new rolling machinery will be installed in the rod mill. An annex to the fence mill houses chain link fence galvanizing facilities.

Armco Drainage Expanding

Armco Drainage & Metal Products Inc., a subsidiary of Armco Steel Corp., Middletown, O., is building a steel fabricating plant at Davis, Calif. The $300,000 facility will be in operation by midyear. It will make corrugated pipe

(*Please turn to page* 90)



PAINT MILEAGE JUMPS

from 370 to over 600 square feet per gallon with

RANSBURG NO. 2 PROCESS

● When General Water Heater Corp., in Burbank, Calif., switched from hand spray to Ransburg No. 2 Process in painting water heater jackets, paint mileage increased almost 65%. Where General formerly got 370 square feet per gallon of paint, they now get over 610 per gallon.

On this installation, units ranging from 20 to 100-gallon size are painted with Ransburg No. 2 Process reciprocating disc atomizer. Changes in jacket sizes can be made without stopping the conveyor. With the reciprocating disc atomizer, change in stroke length is made "on the fly" without shutting down production. General also paints smaller parts, such as heater tops, bottoms, doors and legs, with the Ransburg equipment.

In addition to paint and labor savings, General Water Heater is getting "excellent consistency" and a high quality finish on their products. Another on-the-job-example of the unmatched efficiencies of the Ransburg No. 2 Process of electrostatic spray painting!

Ransburg maintains complete laboratory facilities for test-painting YOUR products under simulated production conditions. Why not let us show you what Ransburg Electrostatic Processes can do for you in YOUR finishing department. No obligation.

For further information about Electrostatic Painting Processes and complete Ransburg services, write Dept. S

Ransburg ELECTRO-COATING CORP.
Indianapolis 7, Indiana

RANSBURG

Aluminum of

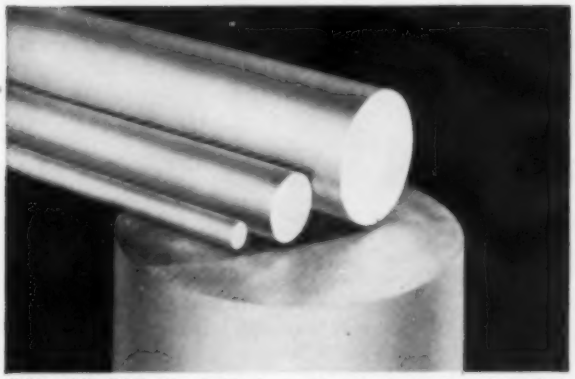
EXTRUDED SHAPES All standard alloys are available in custom shapes (solid, semi-hollow and hollow), structural, rod and bar, and in extruded tube and pipe.

SHEET AND PLATE Supplied as flat sheet, plate, coil sheet, circles in a complete range of alloys, sizes and tempers. Specialty sheet items available on inquiry.

WIRE Supplied as round or hexagonal drawn wire. Also rivet, welding, screening, EC and redraw wire.

Dependable Quality

is our first responsibility



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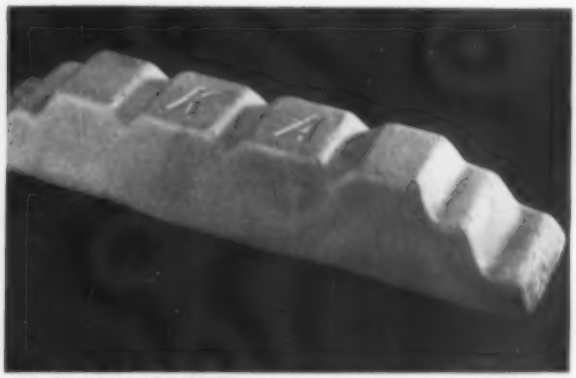

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(*Concluded from page 87*)

and pipe arch (both plain and asphalt coated); sheet piling and Armco multiplate sections for the construction industry. Grain bins and watering troughs will be produced for the agricultural market. The Davis plant will be under the direction of L. W. Hanson, vice president and Calco Division manager for the company, with headquarters at Berkeley, Calif. President of Armco Drainage is S. R. Ives.

ASSOCIATIONS

Metal Lath Manufacturers Association, Cleveland, re-elected H. B. Brown as president. He is merchandise manager, Building Steel Products Division, United States Gypsum Co., Chicago. D. L. Rossiter, sales manager, Engineering Products Division, Inland Steel Products Co., Milwaukee, is vice president.

Robert G. McIlroy, president of Pittsburgh Standard Conduit Co., Pittsburgh, was elected chairman of the Rigid Steel Conduit & Electrical Metallic Tubing section, **National Electrical Manufacturers Association,** New York.

Manufacturers of cemented carbides containing tungsten formed the **Cemented Carbide Producers Association** for the purpose of furthering the use of the products in industry. Hunter-Thomas Associates, Cleveland, will manage affairs of the group.

Cutting Tool Manufacturers Association, Detroit, elected H. R. DeVlieg of DeVlieg Microbore Co., Ferndale, Mich., as president. L. H. Skoglund Jr. of Scully Jones & Co., Chicago, is vice president; and R. S. Spencer, Detroit Boring Bar Co., Detroit, treasurer. Martin J. Ewald was re-elected executive secretary.

Bruce L. Simpson, president of National Engineering Co., Chicago, was nominated to head the **American Foundrymen's Society,** Des Plaines, Ill. Frank W. Shipley, foundry manager of Caterpillar Tractor Co., Peoria, Ill., was nominated for the office of vice president.

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Engineering bulletin S-49 will give you more complete details. Write for a copy and it's yours. No obligation.

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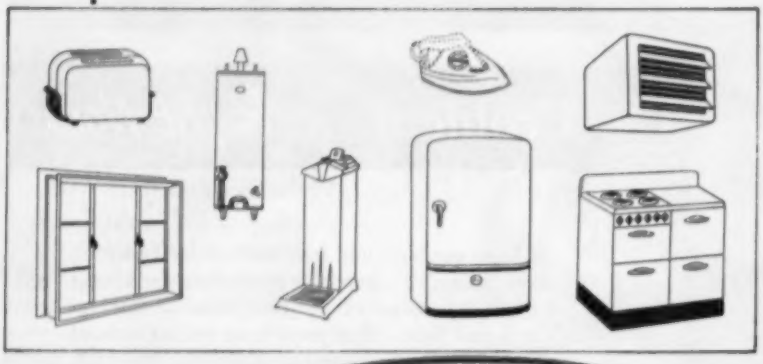

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2

STEEL's 1955 Management Series . . .

The editors of STEEL herewith present the second in their ten-part series, Program for Management for 1955. The complete list:

1. **Product Promotion** (Feb. 14, p. 73)
2. **Budgeting for Cost-Cutting** (Mar. 14)
3. **Plant Layout** (Apr. 18)
4. **Communications** (May 16)
5. **When To Re-equip** (June 20)
6. **Put Business Trends To Work** (July 18)
7. **Consultants** (Aug. 15)
8. **Purchase Analysis** (Sept. 19)
9. **Market Facts** (Oct. 17)
10. **Keep Your Product Growing** (Nov. 14)

• *Extra copies of this article are available in quantities from one to three until supply is exhausted. Write Editorial Department, STEEL, Penton Building, Cleveland 13, Ohio.*

So You Want To Cut Costs

■ **THE FOUR musts for sensible cost cutting are:**

Start with the chief executive who must initiate and implement your campaign.

Start with a long-term program; a stop-and-go affair wastes time and effort.

Start with a goal as expressed in your budget.

Start by making your people understand the objectives and the need for paring expenses.

Dividend — Five dollars wisely saved in costs equal $100 gained in sales. Five dollars unwisely saved may lose you much more in sales. The sensible approach avoids three dangers in cost cutting:

1. Helter-skelter, desperation slashes in inventory, employment, advertising, etc.

2. Pyrrhic reductions when $5000 worth of executives' time on a project saves only $4000.

3. Pinchpenny budgeting which will not enable you to share in economic growth ahead.

The great test in 1955 for management in this area will be to control costs but leave room for progress.

Starting Point—Where to begin? The chief executive officer must spearhead the program. He may appoint a committee or delegate a subordinate to work out details, but he initiates and implements the program.

His job is to oversee a company plan of operations for the next five or ten years and to translate it into cost-cutting goals as expressed in an annual budget. How can you make cost-influencing decisions on equipment, product line and research expenditures if you don't know where you're going?

Product Line—The first task is to study the product line. Is it the one you're going to be in for the next decade? Can you simplify it? Why are you in this field? Where is your market? Will it be the same market ten years from now? What about product development? What do you estimate you will need in facilities a decade hence?

After you have made your best estimates as to what your product line will be, the second broad ques-

Can Operations Research Help?

■ Operations research is the assignment of mathematical values to as many intangibles as possible. It's a research attitude for operating problems, a science that can help management reach decisions formerly made largely by intuition.

OR (shorthand for operations research) can be exasperating because some people have oversold it or made it appear as an impossibly esoteric science. Properly used, OR can be helpful and practical in plotting your over-all approach to cost cutting. OR tackles questions like this: Should you spend more money on advertising or physical research? Is your product mix making you the most possible money? Is your inventory management correct?

Many universities and research organizations, such as Battelle Memorial Institute, offer OR services.

tion to ask yourself is: What do I have to make this for to earn a profit? The price to the customer is probably largely determined by competition. If you set your profit at 5 per cent (or any other percentage), it's simple arithmetic to come up with your total cost goal. (Not so simple is the allocation of your expenditures among the various phases of your operation, but more about that later.)

Expense Detectives—When you have set the over-all objective, the next step is to start building control indicators to keep within your cost limitations. That means inventory controls, good production and scheduling controls, budget standards.

Controls probably mean more paperwork. One of the first things a cost-cutter thinks of is reducing red tape. Experts point out that some paperwork is helpful.

Case in Point—Warren C. MacFarlane, president and general manager of Minneapolis - Moline Co., cites this experience: "One means of control on which we depend is our system of reporting daily on production and sales. Of course, paperwork costs money. We have followed a policy of discontinuing reports if not enough people ask for them. But on one occasion when I tried holding up our daily report we had 15 telephone calls asking what had happened to it. That's one kind of paperwork we did not try to suppress again. The daily report has been most helpful in controlling operations—much more so than a monthly report."

How do you develop good control standards? Take the steel industry. Its first major steps toward cost control standards came from 1936 to 1939. In that period, records were developed on equipment utilization, man-hours required to produce a ton of steel, etc. The industry's research people were given the assignment to develop them, although traditionally they had worked almost exclusively on product development.

Long Pull—It's a long pull to develop good standards to fit your plan. Start with a system of bogeys. At first you will have to set arbitrary standards for equipment utilization, department performances and the like. But they at least will measure the improvements. Gradually a realistic standard can be set up.

After you have set your first standards, but before you begin to apply them, the time is ripe to explain to all your people what you're doing. Here's how Clark Bros. Co., Olean, N. Y., did the communications job.

Everybody in the Act — First, weekly shop management conferences were held. Department heads were invited to luncheon meetings held off company property. Many meetings were devoted to a complete discussion of the status of the business. The same graphs shown at executive meetings were exhibited to conference members. The information included total sales, profits, labor costs, manufacturing expenses and other statistics.

Next, department heads held smaller meetings with their foremen. Clark and other companies all find that the foremen can make or break a cost-cutting program. They must be informed on exactly what's being done and why. It is particularly important for foremen to understand why they must accurately fill in the reports that are to become the basis of control standards. Also, they must know what costs are assessed to their area of operations.

Upward Communications — While communications are going down the line, they should be going up, too. Management consultants like Henry W. Spitzhoff of Robert Heller & Associates Inc., Cleveland, believe that boards of directors should be kept better informed of such basic projects as

cost cutting. The president should make periodic reports on the matter to the board, as a matter of policy. In fact, boards of directors, say many management consultants, should initiate the basic demand for a cost control program.

The president should tell the board of his general plan on which the cost-cutting program is based. That information should also be given in detail to all company executives. As much of it as possible should be disseminated down the line as far as foremen, too, but here watch that foremen and others don't get so much detail that they are confused. Make your plan easily understood, say the experts.

In Charge—While the chief executive officer must inaugurate and set the tone for any program, the detailed planning for control should be handled by some other official. A controller or budget director would be good for the job, provided he is a broad-gage executive. An industrial engineer may be suitable. Some companies have a staff assistant to the president who has the responsibility. The task can also be handled by a committee of all the people mentioned above, with the group chairman acting as co-ordinator.

The director of the program, believe the experts, should rarely be the sales manager or chief engineer. People who hold those kinds of jobs usually are not temperamentally suited for long-term cost cutting.

Down to Brass Tacks

So, you have your long-term company objectives; your entire company from the president on down is thoroughly indoctrinated in that plan; a senior executive has been appointed to co-ordinate the plan's details; you know what your total costs must be to make a reasonable profit.

Back Breaker—Now comes the really tough part. How do you know where to cut? Or if to cut? There's the possibility a company's costs are just right. But that's so remote it can be dismissed. However, there is always the question of whether to cut some useful service. That can only be answered by you in the light of your special circumstances. For the rest of this discussion we will confine ourselves to the question: How to cut and maintain at least the same production levels and useful company services to customers.

With your newly instituted cost-control reports and bogeys, you are getting set for a constant whittling away at costs. But that's not enough. Needed is concentration on one or two areas. Concentration will make possible many small gains that will add up to something important. In any program you will probably have to content yourself with the many little savings within an area. It's grubby work, but necessary. The big dramatic cost-saving idea is a rarity.

Concentrate—Where to spotlight attention? A rule of thumb is: Where you spend the most money. In steel most of it is spent on facilities. In canmaking, it's the materials. In railroading, it's labor. Back in the 1930s, the steel

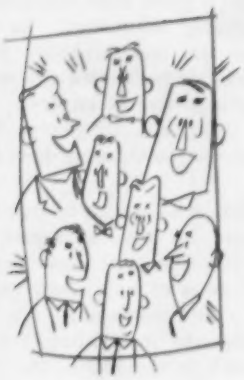
Where Spending Is Saving

■ Sometimes it pays to spend money to save it. Research is a notable example. Battelle Memorial Institute, Columbus, O., finds that the majority of its projects have cost cutting as the prime objective. Three major ways to cut costs through research are to get better materials, products or production processes.

If a company comes to Battelle and says: "We have money to spend on research if it will cut costs," the institute does this:

1. Takes a broad look at company operations.
2. Decides what's needed—it may not be research, but if it is, it does this:
   - A. Studies the composition of the product. Is it right for the times? Is it of competitive quality?
   - B. If the composition is O.K., then quality is the next thing to appraise.
   - C. If that's all right, then methods of production must be studied.

Companies today, Battelle finds, usually rely upon the supplier for research on materials, so most development research goes into the product and techniques for making it. The institute believes that two of the most productive areas for cost saving through research are on corrosion and materials handling.



Talk About Cost Cutting

■ "We found that our major opportunity for savings came from reduction of indirect labor." A. Richard Todd, Todd Co., Rochester, N. Y.

"A company's long-term plan of operations must allow for the unexpected. Know what you will do in case of a 20 or 30-per-cent business drop." Henry W. Spitzhoff, Robert Heller & Associates Inc., Cleveland.

"Cost reducing is just like a machining operation: First the roughing cut, then the finishing cut, finally the grinding cut." Charles Stillwell, Warner & Swasey Co., Cleveland.

"Our survival as a small company in the automotive industry depends largely on the combined contribution of all our employees toward . . . elimination of misdirected effort." Robert D. Welles, Randall Co., Cincinnati.

"Do not overlook the opportunities for cost-saving ideas that come from talking with vendors, reading technical publications and attending association meetings." Robert C. Ross, Eastman Kodak Co., Rochester, N. Y.

"We believe that more cost-reducing ideas and innovations can reach a company through purchasing than any other means." Joseph A. Teece, Fansteel Metallurgical Corp., North Chicago, Ill.

"We seem to overlook areas of indirect costs even though they represent 25 to 50 per cent or more of our total expenses." Roland T. Nelson, Norton Co., Worcester, Mass.

"Our major accomplishment to date (in an expense-paring program) has been the stimulation of interest and desire of our foremen and superintendents to do something about cost reduction." Henry G. Lykken, Minneapolis-Honeywell Regulator Co.

companies knew what they were doing when they spent so much effort trying to improve equipment utilization.

Yet, it's wise to go further than just by guess and by gosh. Kenneth L. Block of the engineering consulting firm, A. T. Kearney & Co., Chicago, cites the case of a gas range manufacturing company. It obtained cost ratios on the expenses that were parallel for its major competitors. Here's how they looked:

	Material	Labor	Overhead
Gas Range Firm	43%	14%	28%
Competitor A	40	6	28
Competitor B	42	8	25
Competitor C	40	9	23

Now the first gas range firm knew where it stood and how to budget to concentrate its efforts. It was farthest out of line on labor costs, not material, where it spent the most money.

Caution—"When you set your material, labor and burden goals," says Mr. Block, "it does not mean that each of the individual goals has to be made. But they must be achieved in total."

Another way to test what your cost distribution should be is to chart the trend of your material, labor and burden figures for the past 10 or 20 years. That indicates which of the major factors are most out of line.

Saving on Materials

Material expenses may run from 15 to 75 cents of your sales dollar. The average is 55 cents. So here's a major place for the cost detective to look. "Generally speaking," says Mr. Block, "there are three organizational areas in which we may center our drive to reduce material costs." They are the engineering, production and purchasing departments.

Engineering — A major chance for cost saving is offered by new and cheaper materials to do the same or a better job. For example, Hydreco Division (Cleveland) of New York Air Brake Co. shifted to powdered metal for gears in pumps and saved 20 per cent. Product standardization is another golden opportunity for engineering. The American Standards Association says that a standard on transformers which was approved in 1954 will save an estimated $100 million the next three years.

Production — Production men have all kinds of ideas for saving, too. For example, a worker at Crucible Steel Co. of America's Sanderson-Halcomb Works noticed that lead from drawing machines was being scrapped. He suggested its resale to the vendor. The saving was more than $1800 the first year.

Purchasing — Good buyers are always on the lookout for savings in materials. For example, Fansteel Metallurgical Corp., North Chicago, Ill., used a commercial grade lime costing $22.72 a ton to neutralize acid and chemical waste. It found a waste product, lime flue dust, which did the same job at about one-third the cost. Saving: Nearly $5600 per

year. So attractive are the possibilities of savings through better purchasing that STEEL will devote a Program for Management article Sept. 19 on it. Stressed will be the importance of buying indirect materials (small tools, etc.) as well as direct.

For a hint on the importance of purchasing in cost control, listen to Wilbur F. Hoehing of Westinghouse Electric Corp.: "We are convinced that one of the most lucrative sources of cost reduction is through better management and control of inventory. . . . We are well on our way to increase our inventory turnover by 15 per cent, with substantially decreased operating costs and generally better —about 10 per cent—delivery performance."

Saving on Labor

The greatest concentration has probably been made by metalworking in cutting labor costs—at least it has had the most publicity.

More Frontiers—But there are still new worlds to conquer, especially with better plant layout and equipment. STEEL will also devote special articles to those matters on Apr. 18 and June 20.

Direct labor costs are still too high in many companies, the experts say. In some cases industrial engineers complain that the union won't let them make changes. But firm determination and untiring efforts will often accomplish major results. Studebaker won some major concessions from the union at South Bend, Ind. Kaiser-Willys was able to make similar changes to reduce direct labor costs at its Toledo plant.

Another Method—"Yet an additional way to keep direct labor costs in bounds," says Kearney's Mr. Block, "is to set up a methods program aimed at reducing work content." The same results are often achieved through a work simplification program. That obtains the participation of all employees who suggest ways to make their own jobs easier and quicker. One medium-sized company saves about $200,000 annually that way.

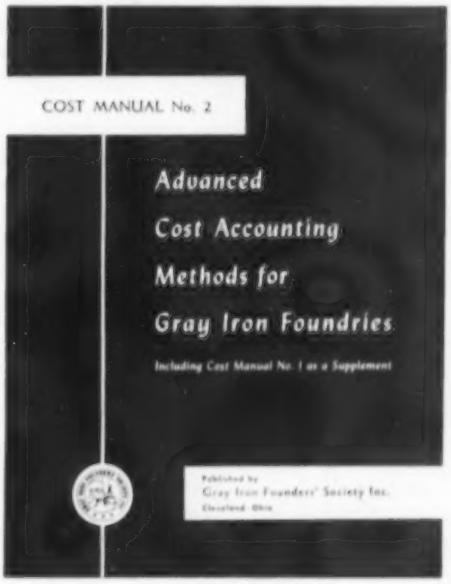
Labor savings may also be achieved through better production planning so that work assignments, material and tools are available at the right time and place. Product redesign can cut labor charges, too.

Even if you don't pay on a piecework basis or on some similar incentive system, it's a good idea to evolve standards for job performance or equipment utilization. Then, you can take remedial steps when performance slips.

Saving on Overhead

The third major area of industrial expense is overhead or burden cost. Probably the least has been done about this one. That's because overhead is often difficult to pin down, hard to set standards for.

Principles—But the same rules apply to controlling overhead costs as to any other kind of expenses:



Trade Associations and Costs

■ The Gray Iron Founders' Society Inc. has sponsored local cost groups from coast to coast to study and compare gray iron costs from every possible angle. Nineteen such groups have been established (a few foundries have been members for 30 years or more).

The society goes on the hypothesis: "The regular and systematic comparison of current costs per pound with those of previous months and with the best past performance is the most essential factor in any effective cost-control program."

Group members send the "group cost consultant" a record of their costs for the preceding quarter. The consultant prepares a "quarterly cost comparison." Each foundry's costs per pound for various important items, mold and core overhead percentages and other significant figures are listed under a symbol number (company names are not disclosed). Each member gets a copy of these comparisons, and they are explained and discussed by the consultant at quarterly group meetings.

Comparisons enable a member to locate items of cost which are high.

Get the facts about expenses wherever possible; budget your overhead costs; concentrate your attention where you are spending the most money.

The amount of money spent on overhead items will vary, but these areas are usually the most expensive: Materials handling, maintenance, quality control, clerical costs, selling expense, and traffic management.

Materials Handling—Specialists conservatively estimate that at least 20 per cent of industry's manpower is spent in handling. Some authorities place it as high as 80 per cent for some industries. In 1953, on the 20-per-cent basis, Eastman Kodak Co. spent $55 million for materials handling. A cost reduction of only 1 per cent would save $550,000.

Robert C. Ross, senior industrial engineer for Eastman, reports that the way to cut costs on handling is to pick a handling job, break it down, question every detail, work out a better method and then apply the new method. Elimination of the handling altogether may result from the study.

Maintenance—Saving on housekeeping costs can be simplicity itself. Applying the same approach that Eastman did on handling, Minneapolis - Moline analyzed housekeeping at one of its plants. It discovered it had 30 janitors there. A time-study group reduced the number to 14. The company president says: "I think we are doing as good a job of housekeeping as we did before." General Electric Co. predicts that industry's maintenance costs will climb 9 per cent in 1955 over 1954's. Will yours?

Quality—Costs can be reduced, too, through lowering the expense of quality control. Bendix Aviation Corp. finds the key to that is better receiving inspection. Good scrutiny of purchased parts and materials substantially reduces rejection of Bendix parts. It recommends a form of vendor certification. Suppliers often offer such a service for competitive reasons. Generally, the vendor and the consumer must study how the vendor's product is to be applied in the buyer's product. They must agree on a satisfactory final method of inspection at the vendor's—such a method to include agreement on the sampling plans used, the quality characteristics to be checked and inspection instruments to be used.

Usually, when such an arrangement has been agreed upon, the vendor submits a certification with each lot of material. The consumer satisfies himself that the vendor is performing satisfactory final inspection by periodically inspecting a lot and by keeping close check on how the purchased item is behaving in his product.

That kind of certification really paid off in a large electronics company. The firm was receiving 10,000 lots of material a month with an average lot rejection rate of 12 per cent. That meant 1200 lots were rejected each month at a cost of about $18,000. After a vendor program had been in six months, the rejection rate dropped from 12 to 8.5 per cent, resulting in a monthly saving of about $5250.

Clerical — For every 30 factory workers there was one clerk sitting in the front office in 1900. Today, there are about 10 for every 30 in the plant. Today's typical firm finds about 10 per cent of its sales dollar going into a nonproductive phase of doing business — paperwork. Although few expect electronics and automation to take over the clerical function, not a few hope for an office which will be the white-collar equivalent of an engine block machining line, with equivalent cost savings.

Of about 4 million business offices in the country, only about 10,000 warrant a major degree of automation. But all 4 million can mechanize to some extent and thus save expenses.

Sales Expense — The average cost of the industrial salesman's call, according to Sales Executive's Club of New York, is $17.24. The cost of getting an order is $187.39. The cost of keeping a salesman in the field has increased more than 25 per cent since 1950.

Getting Employees On Your Side

■ Experts agree that cash incentives help assure the cooperation of employees in cost cutting—provided they are well administered in a company that's already efficient.

Gaining popularity as an incentive is profit sharing. Last year more than 2000 companies filed profit-sharing plans with the Internal Revenue Service, bringing the national total of programs to about 8000. A typical share under those plans is about 20 per cent of profits, which gives to the employee, on the average, an increase of about 10 per cent in his annual earnings.

Plans are basically of two types: A cash disbursement on a monthly, quarterly, semiannual or annual basis; or a profit-sharing trust which is a pension-type payment upon severance, death or retirement. Some plans combine features of each.

Some advantages of a good plan: Up to a 40 per cent increase in productivity; reduction in labor turnover, absenteeism and tardiness; better care of company equipment; improved product quality; decrease in material waste and product rejections; more and better employee suggestions.

You're wasting time, money and effort if your salesman is chasing smokestacks, talking to poor prospects or neglecting to follow through on good ones.

Better training, closer supervision of salesmen and sharper analysis of prospects can all cut costs. A bad habit salesmen fall into is to criss-cross their territories in pursuit of hunches and hopes. Another is to get their time schedule so confused that they either fail to follow up at all or fail to pick up at the right time and point. As most sales are made after the fifth call, nothing is a greater waste of time, once you have created interest, than to neglect to follow through.

Traffic Management — America today is spending at the rate of $17 billion a year on freight. Here is another rich vein of cost-saving ore. And it can be mined. Circumstances vary from company to company, but here are what some firms were able to do:

A traffic manager for an Indiana appliance maker consolidated inbound and outbound shipments to produce savings of $50,000 a year. A traffic manager for a Louisville fabricator eliminated branch warehouses in favor of public warehousing to the tune of a $2000-a-month saving. A traffice manager for a New York electronic parts firm convinced top management of the value of company-owned transport and netted savings of $156,000 the first year.

Are the People with You?

People are at the core of any cost-cutting system. If they're cooperating, your program's chances of success are good. If they're not, your plan is doomed to failure.

So, communications are all-important. Besides explaining to all concerned what you're doing and why, you have to go far beyond that. You have to get their enthusiastic support.

Two Don'ts — One way not to get that support is through careless handling of any personnel displaced in your cost-paring campaign. Explain to your union in advance what you are going to do about displacements. In addition, carefully publicize your policy in the compay newspaper or other media. If at all possible, explain how you can absorb some personnel in other departments. If you must lay off, give details on how you will do so. Make the point that make-work programs to keep displacements busy will weaken the company and the job security of those who remain.

A second way not to get employee support is through salary cutting. "You can't cut salaries to justify poor management," says Charles Stillwell, president of Warner & Swasey Co., Cleveland.

Positive Approach—U. S. Steel Corp. says: "Start first in cost cutting with people, not processes, equipment or techniques. Instill in them the understanding for the need of cost cutting." They approached the problem by making a movie to show employees why expenses should be pared.

Other companies publicize the campaign with a contest. A scoreboard is set up showing how each department is faring in a competition to see who can cut the most costs. Minneapolis-Honeywell Regulator Co. has a booklet called "The Big Picture" which explains the reason for cost cutting.

Imagination—Heller's Mr. Spitzhoff believes that the imagination of many executives and other employees can be appealed to in cost cutting.

But he and most consultants agree that any expense-paring operation will work better if you have controlled financial incentives. The incentive programs for production workers have too often failed because they were regarded as a substitute for management. They were too often not kept up to date, or not administered fairly or honestly.

Why Success? — The National Industrial Conference Board reports that about 60 per cent of all incentive programs have been abandoned. The reasons outlined above, plus organized labor's opposition to incentives, explain the failures. A more pertinent point, though, is: Why have the 40 per cent succeeded?

Three reasons explain the success: The plans are honestly administered; they are ably admin-

How Other Industries Are Doing: Typical Net Profit Ratios to . . .

Industry	Net Sales	Net Worth
Automobile Parts	5.5%	14.8%
Industrial Chemicals	6.1	8.9
Electrical Parts	4.5	11.8
Foundries	5.0	13.2
Hardware & Tools	8.3	14.3
Industrial Machinery	5.7	12.3
Metal Stampings	4.7	14.5
Building Contractors	2.3	10.7

Ratios of Material, Labor and Overhead to Sales

Industry	Material	Labor	Burden	Total
Gas Range Mfg.	48%	10%	20%	78%
Highway Trailer Mfg.	50	8	11	69
Millwork	16	25	25	66
Ordnance—Shells	43	13	34	90
Pump Mfg.	24	16	33	73
Tank Trailer Mfg.	39	16	20	75
Woodworking Machinery Mfg.	46	5	9	60

Source: From a paper prepared for American Management Association by Kenneth L. Block, A. T. Kearney & Co., Chicago.

Self-Quiz for Cost Cutting

In budgeting for cost cutting . . .

1. Is your chief executive officer spearheading the program?
2. Do you have a long-term campaign rather than a stop-and-go affair?
3. Have you a goal for cost-cutting as expressed in your budget?
4. Is the job of working out details of your program delegated to an appropriate executive or committee?
5. Are your future product and facility plans given sufficient weight in your budget?

In developing your statistical controls . . .

6. Are the figures accurately reported by employees?
7. What does it cost to produce this job in other companies or by other methods?
8. Are scrap or rejects seriously affecting operating costs?
9. Are you losing time in re-do jobs?
10. Are handling costs too high?

In concentrating on cost areas . . .

11. Have you figures of past performance with which to compare current operations?
12. Can you get comparable operating figures from competitors?
13. Where do you spend the most money?
14. Are you giving special attention to overhead costs?
15. Are you giving special attention to inventory management?

In getting your employees behind you . . .

16. Have you considered a monetary incentive program for your company?
17. Do all your executives know the details of what you're trying to do and why?
18. Have you given your foremen enough details for adequate understanding?
19. Can you stimulate co-operation with a cost-cutting contest?
20. Will you spend money to save?

istered; they were installed after the company had achieved a high degree of efficiency. No incentive plan will ever work when a company has sloppy operations. The same applies for financial incentives for middle and upper management. They're usually a help in cutting costs when reasonably applied after the company is on a fairly economical footing.

Suggestion Systems—One form of incentive is the suggestion system. Firms like Crucible Steel rely heavily on it. In 1954, 1137 suggestions were processed through its plan. Some 22.7 per cent were adopted, compared to a national average of about 29 per cent. Crucible profited from suggestions to the tune of $65,894 in 1954. In the seven years of its operation, the plan has brought it $395,042 in tangible economic gains.

Outside Help—To get your program implemented you may also need outside help, as well as a good incentive program. Watch business magazines for cost-saving tips. Good management consultants are cost specialists. Trade associations can often help. The Gray Iron Founders' Society has an outstanding cost accounting program. Groups such as the American Management Association publish scores of booklets on the subject and hold several conferences each year on the matter. Outside research organizations, such as Battelle Memorial Institute, offer valuable help.

Several firms have found it profitable to put on a cost-cutting committee at least one able employee who does not usually deal in such activities. He often provides a fresh approach that turns up unexpected opportunities for savings.

Four Starters

But however you implement it, the four musts for sensible cost cutting are:

Start with the chief executive of your company.

Start with a long-term program; a stop-and-go affair wastes time and effort.

Start with a goal as expressed in a budget.

Start by making your people understand your objectives and the need for paring expenses.

INDUSTRY GEARS FOR HIGHER PRODUCTIVE STANDARDS

C.P.C. and THE BUDD COMPANY take a new look at frame production

The specially designed 1,000 ton press shown here illustrates a new approach to the production of automotive frame sections—edgewise forming of blanks into the irregularly-shaped frames. *Clearing Productivity Consultants worked with The Budd Company to develop this unique press for their specific requirements. An unusual slide action and automatic feed were developed which simplify the forming operation, speed material handling and conserve material.

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STEEL

March 14, 1955

Technical Outlook

ZINC STANDARDS—The Bureau of Standards will soon have available spectrographic standards of zinc base casting alloys for any industry needing them. The standards are a co-operative venture of the Bureau, General Motors and National Lead Co. For uniformity the standards are cut from one 333-ft bar, formed by continuous casting.

DRY PROTECTION—For extinguishing fire with dry chemicals, the newest wrinkle is a dry chemical piped system. Underwriter approved, it gives automatic protection against Class B and C fires. It is being used for paint dip and oil quench tanks, transformer vaults, flammable liquid storage rooms.

NICKEL NEWS—If you're one of many suffering under the nickel pinch, despite the increased supply, here is heartening news. The free world produced 390-million lb last year, or 50-million more than in 1953. Experts look for another jump of 25-million lb this year. Less of it will go to government stockpiles.

GROUNDED OUT—How safe are those ground connections when hazardous liquids such as gasoline are being transferred? A safety interlock will prevent fuel loading from being started or continued if resistance of the ground connection rises above the acceptable level. It may have other applications where static build-up is a fire and explosion hazard.

AGGLOMERATION ANSWERS—Have you an ore or mineral with unknown agglomeration characteristics? Koppers Co. is equipped to search out the best processes in its new lab at Swissvale, Pa. Facilities can handle 400 lb of material at a time. Flow diagrams and equipment requirements can be worked out for the various materials. Use of agglomerated materials is rapidly increasing in iron, steel and ore industries because of the shorter supplies of high-grade ore and because of the more efficient operation with the agglomerated material.

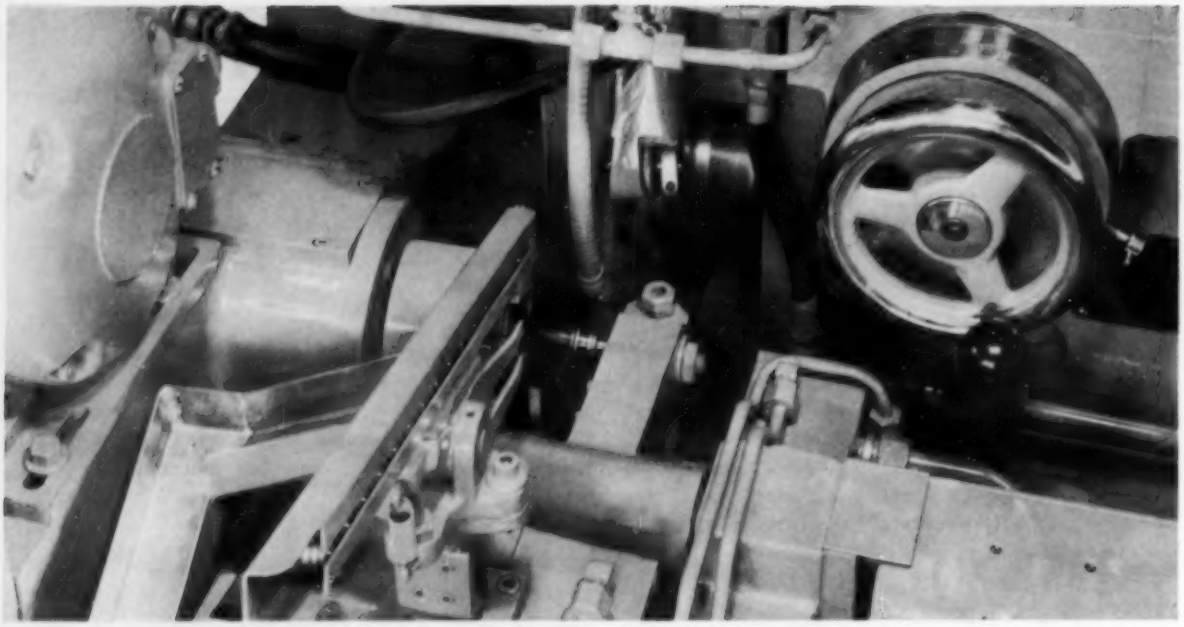
NEW PROSPECTS—Wright Air Development Center says experiments with aluminum titanate suggest its use in such jet engine applications as nozzle diaphragm blades and flame tube liners. Electrical insulation is another prospective use for the refractory material which has a melting point close to 4000° F.

PEARLITIC CRANKSHAFTS—Gossip in Detroit metallurgical circles has it that General Motors will start using pearlitic malleable cast crankshafts in at least one line of engines before the year is out. There is a strong possibility that it will then sweep through the rest of the GM engines. Packard is getting interested, too.

CLEAN SPREAD—Oil that spreads fast is easy to clean. There's a definite relationship between cleanability and oil spreading rate, says Henry B. Linford, Columbia University professor. You don't need to know the composition of the oil—just watch how fast it spreads over a clean sample of metal. Variables, besides oil type, are surface roughness and composition of the metal.

GETTING READY—Increasing importance of titanium forgings in modern aircraft has prompted Alcoa to set up a technological development group whose work will be solely in titanium. With the giant forging presses nearing completion in Cleveland, this group will have the world's largest facilities as laboratory equipment.

Metalworking Outlook—p. 47 Market Outlook—p. 135



Concentric grinding machine gets a production assist as . . .

Loaders Boost Grinder Output

They run the gamut from simple handling devices to completely automatic systems. Here are some of the factors that determine loading requirements in terms of the job

By A. J. JONES
Chief Engineer
Landis Tool Co.
Waynesboro, Pa.

AUTOMATIC loading and unloading brings automation to cylindrical grinding. What's more, it can be done at a cost that makes it attractive to virtually every plant.

Much has been written about the automatic factory and giant automation setups. Too often, however, little attention is paid to small scale automation ideas that apply directly to a vast majority of the machining industry.

Now It's Ready—Mostly because of its demand for personal care and observation, precision cylindrical grinding has resisted the application of automatic load-unload devices.

The development of more rigid machines, more accurate feeds and more dependable controls, has opened the door to automation.

How Much—In addition to your available capital, you'll need to analyze your production and accuracy requirements before you can decide how far to go into automation.

For some low-production parts a simple handling device may give the best cost picture. In other cases, you may want a completely automatic machine that picks up a part, loads it, grinds it to size and unloads it—all automatically.

Grades—Loading and unloading devices can be classified according to their automaticity.

1. First, a fully automatic work handling and machine load-unload mechanism can be tied in with a fully automatic cycle. For example, the part is picked up and loaded into the machine; the work cycle begins and continues until the ground diameter is within limits; the cycle stops and the part is unloaded before loading the next piece. On this same machine, the grinding wheel is dressed automatically after a preset number of work cycles, and the wheel head is moved in to compensate for the amount removed in dressing.

2. A slight variation of the first type is semiautomatic to the extent that a light or some other warning device tells the operator of the need for wheel truing, size compensation, etc.

3. Also, a power operated loading and unloading mechanism can be tied in with a manually operated machine to provide safe loading of an odd-shaped part. Each cycle is started manually.

4. Hand-operated loading devices may be advisable where hand feeding is particularly hazardous.

Automatic loader and ejector boosts the capacity of this machine to 115 pieces an hour. Operation is grinding piston skirts. Stock removal is 0.015 in.

5. In addition to these loading systems, hoists or lifting devices can be tied in to handle heavy or cumbersome parts.

Generally, the more automatic the setup, the higher is the initial cost and the cost of maintenance. On the other hand, savings in time, with a resultant lower cost per piece, often make the fully automatic system the best one.

Why?—What are the reasons for even considering automation? Here are four basic factors by which it can be justified:

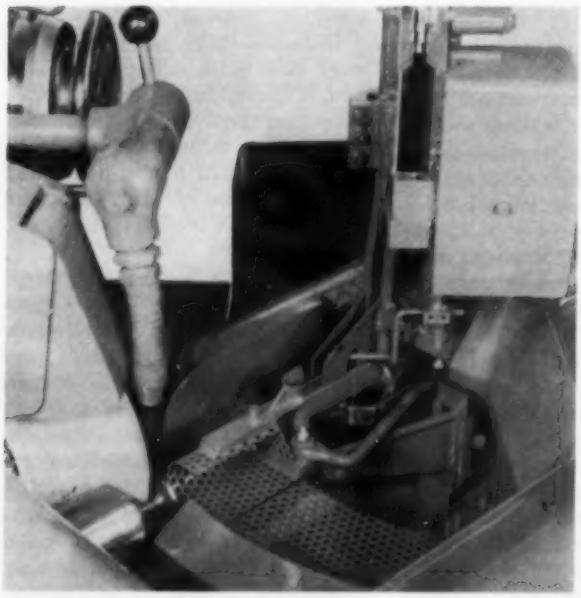
The most obvious, and usually most important, reason for going to more automatic methods is the promise of lower cost per piece. The automatic setup, properly maintained, has no fatigue factor —will produce at the same pace over long periods without delays or stoppages. Often, operators can be assigned to other jobs in the plant. The net result is a lower direct labor cost on the job being run.

A second important attribute of automation is the positive uniform quality of production. Because the human factor is lessened, or even removed, each work cycle is repeated without variation and workpieces are duplicated consistently. This factor alone may make the automation necessary.

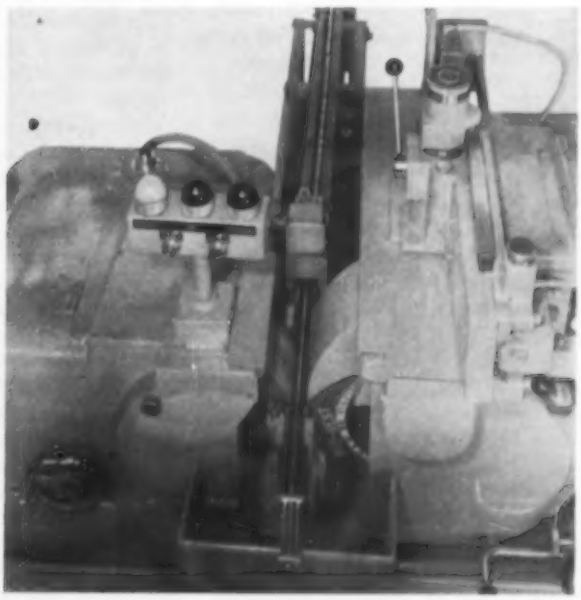
No Panacea—Two other points to consider are operator safety and savings in floor space. Automatic loading, unloading, cycling, etc., keep the operator's hands out of the dangerous working area.

When work handling systems are mounted over the machine, and when much of the cycle is automatic, there may be a lessened need for wide aisles between machines. Machines may be moved closer together, making room for more equipment in a given area.

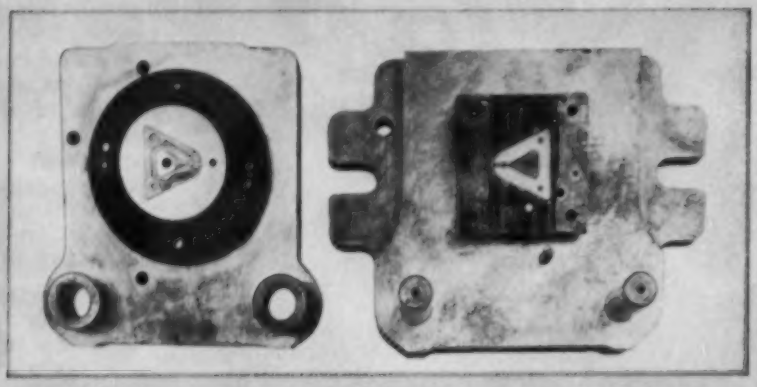
As is true with many technical developments, the increasing application of automation is not a cure-all for low production cost nor is it confined to the fully automatic factory. Some of the most significant savings and gains can be made by automating the cycle of standard or semistandard machine tools.



Removing 0.008 in. of stock, this machine rough grinds 450 valve faces an hour. It has air operated automatic loading and ejecting mechanisms



One of the simplest automatic feeds, hopper feeds pins to a plain centerless grinder



Hot work dies used on a 30-ton press to blank 500 magnets per hour from 17 per cent cobalt strip at 1800°F

HEAT TREATING TOOL STEELS

By H. C. MANLEY and G. E. BRUMBACH
Carpenter Steel Co.
Reading, Pa.

Hot Work and High Speed Types

This is the last in a series of five articles on heat treating tool steels by Messrs. Manley and Brumbach. First, Jan. 24, and second, Jan. 31, covered water hardening types. Third, Mar. 7, and fourth, Mar. 14, covered oil and air hardening types.

MODERN manufacturing requires tools and dies to perform many jobs. Some are at room temperature. Some are at elevated temperatures. Heat may come from contact during forming of hot metals or friction from high speed cutting.

Hot work and high speed tool and die compositions keep high hardness at elevated temperatures. This is in contrast to properties needed in water hardening (STEEL, Jan. 24 and 31) and oil and air hardening types (STEEL, Feb. 7 and 14).

Proper heat treatment gives hot work steels an optimum combination of strength, wear resistance and toughness to resist mechanical stresses that are exerted upon them at the working temperatures.

High speed steels must hold a sharp cutting edge at high speeds with heavy cuts. This means high hardness with sufficient wear resistance and toughness.

Compositions—To satisfy these severe requirements of hot work and high speed applications, a large number of specific analyses have been developed.

In general, compositions that perform satisfactorily under heat, pressure, shock and abrasion normally contain relatively large amounts of tungsten, molybdenum, chromium and vanadium. The carbon content is low, 0.30 to 0.50 per cent for the hot work shock resistant analyses. It is higher, 0.70 to 0.85 per cent, and sometimes up to 1.25 per cent, for high speed compositions that must have superior wearing qualities.

Example—Representative of hot work steel is the 0.35 per cent carbon, 3 chromium, 9 tungsten, 0.40 vanadium analysis. It has high compressive strength, good hardness at elevated temperatures and a good balance of wear resistance and toughness for many hot work applications.

Experience indicates (STEEL, Feb. 7, chart, p. 112) that a composition having 9 per cent tungsten as the major alloy would have some austenite present at a temperature of 1455° F and that the addition of 3 per cent chromium would raise the eutectoid temperature to 1500° F.

Chromium does not affect the eutectoid carbon content as much as tungsten. Since there is only 3 per cent present, it is assumed that effect of chromium on eutectoid carbon point is negligible.

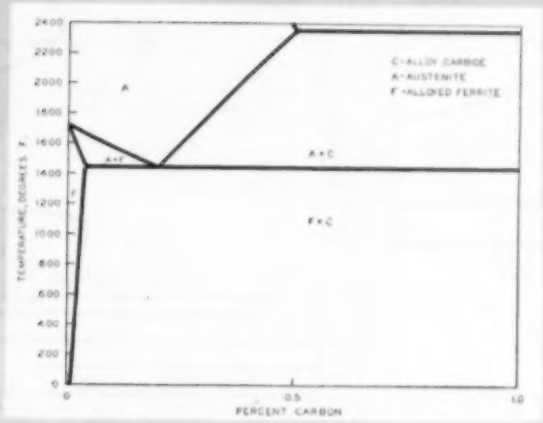


Fig. 1—The alloyed iron-alloy carbide phase equilibrium diagram

This means the eutectoid carbon content as determined from the relatively large amount of tungsten is about 0.25 per cent. This hot work analysis actually starts to form austenite at about 1520° F which is in good agreement with the predicted 1500° F.

High Speed—A typical high speed steel has this analysis: 0.80 per cent carbon, 4 chromium, 5 molybdenum, 6 tungsten, 2 vanadium. It has all the high speed properties of the standard 18-4-1 analysis, with these desirable characteristics: Lower cost, lower density, markedly lower hardening temperature and easier machining.

As with the hot work analysis, experience indicates that 5 per cent molybdenum and 6 tungsten will increase the eutectoid temperature to about 1510° F, assuming the effect of each alloy on the temperature change is additive.

The eutectoid carbon content is about 0.20 per cent for either 5 per cent molybdenum or 6 tungsten. These data, as well as other information of value to the heat treater, are summarized in Fig. 1.

Carbides Needed — The carbon content of this analysis is substantially higher than the eutectoid value. This means that the structure, when properly heat treated, contains a large amount of carbides. Experience shows they are necessary for wear resistance needed in high speed steels.

The time-temperature-transformation diagram of the typical hot work analysis is shown in Fig. 2. It follows the general trend of the effect of alloy addition on transformation of unstable austenite.

Slow Change—The plot shows a large amount of time is required for the transformation of austenite in the temperature interval from the critical down to 1100° F.

A wide temperature range is present from 1100° F down to about 800° F in which the austenite is stable for a long time.

This is followed by a region extending to room temperature, characterized by the formation of bainite or martensite, depending upon temperature.

More Alloy—The time-temperature-transformation properties of the molybdenum - tungsten high speed composition are given in Fig. 3. This plot shows the trends resulting from increasing amounts of alloy.

The time interval necessary for the start of the austenite transformation is considerably longer.

Increased sluggishness of the austenite to transform is also reflected in the fact that the transformation to a completely bainitic structure does not go to completion.

A tool or die made of this high speed analysis would contain about 75 per cent martensite, 15 to 20 retained austenite and 5 to 10 carbides when quenched in oil.

Deep Hardening — Based upon the time available at different temperatures for the transformation of austenite, Figs. 2 and 3 indicate that these compositions are capable of deep hardening.

For example, a 4-in. section of the typical hot work steel develops a surface to center hardness of 48 to 50 Rc when oil treated from 2175° F. Hardness is 45 to 47 Rc when air treated—essentially full hardness for the carbon content of this hot work analysis.

This hardness in the as-quenched condition is lower than that obtained with cold work tool and die steels. But it is adequate because steels for hot work applications generally are drawn to a hardness of 40 to 50 Rc, depending upon whether hardness or toughness is the main requirement.

More Hardness — High speed steels are deep hardening, too. Because of the higher carbon content, the surface hardness in large sections is higher than that of hot work compositions in the as-hardened condition.

To get the high red hardness properties that hot work and high speed tools and dies must show in service, they are heated to a high hardening temperature — usually 600 to 800° F above the critical.

A variety of furnaces are used: Direct fired; semimuffle, both oil and gas fired; controlled atmosphere, gas or electric; and neutral salt baths.

Warm-Up—Preheating the work at 1500 to 1600° F is general practice. It keeps production at a maximum and helps control warpage and distortion.

Unless a salt bath is used, controlled atmosphere furnaces are good for preheating parts that must be free of decarburization and scaling. The atmosphere contains 4 to 8 per cent carbon monoxide and is circulated freely.

More Heat — After thoroughly preheating the work, it is placed in the hardening furnace (neutral salt bath or controlled atmosphere). It remains there long enough to dissolve the alloy carbides without excessive grain coarsening.

Because of the high temperatures used for hardening hot work and high speed steels, a soak of

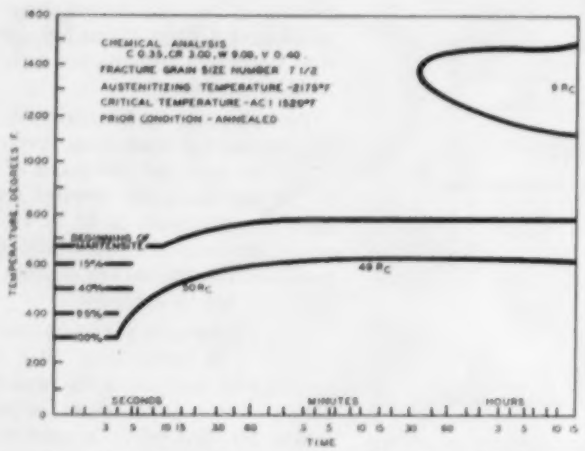


Fig. 2—The time-temperature-transformation diagram of a typical hot work steel

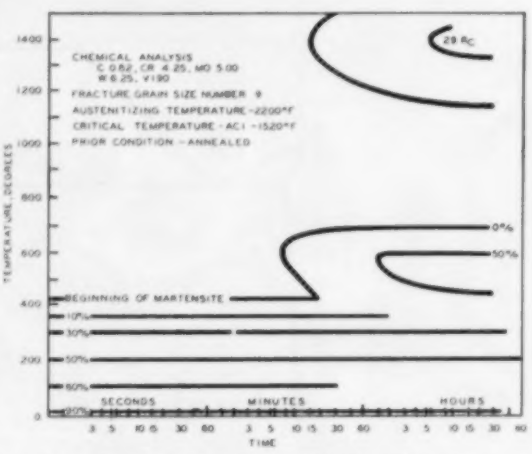


Fig. 3 — The time-temperature-transformation diagram of a typical high speed steel

2 to 5 minutes is employed. When controlled atmosphere furnaces are used for the high heat cycle, the atmosphere should be kept at 9 to 12 per cent carbon monoxide and freely circulating.

When the application requires principally red hardness, the hardening temperature is on the high side of the recommended range.

If toughness is desired, with some sacrifice of red hardness, work is hardened from the low side of suggested hardening range.

Wide Range—One of the most significant characteristics of the time-temperature - transformation diagrams of these higher alloyed steels is the wide temperature range in which there is no transformation of austenite for long time periods.

For the high speed composition in Fig. 3, this interval goes from 700 to 1150° F.

How Is It Used?—When a heavy or complicated die or tool made of the molybdenum-tungsten, high speed type is quenched from 2200° F, the stresses that develop on cooling may cause warping. Taking advantage of the stability of the austenite, the work may be quenched from 2200° F into a bath at 1000 to 1100° F, held until the temperature is equalized and then air cooled.

This technique minimizes quenching stresses and distortion. Hardness and structure are the same as a direct quench, provided the bath temperature is in the range of 1000 to 1100° F.

Here, Too—The time-temperature-transformation diagram of the hot work composition of Fig. 2 also shows a wide temperature range from 800 to 1100° F where austenite is stable.

This means the hot quenching procedure works here, too.

Below Zero—High speed steels normally contain considerable retained austenite in the as-hardened condition. For this reason, it may be desirable to transform it to martensite by cold treating to a temperature of −120 to −150° F.

Experience with cold treated, high speed tools, such as drills, milling cutters, gear cutting hobs or taps, indicates increased performance as measured by parts machined per grind in comparison to tools treated in a conventional manner.

Hazard—Keep this in mind: Work cold treated may crack on cooling to such lower temperatures. This danger is minimized with precautions such as slow cooling to the cold temperature, or a draw at 950 to 1050° F preceding the cold treating procedure.

As a general rule, the benefits of cold treating are more noticeable when the original heat treating was not done right.

Hotter Draw—To develop the red hardness property, high speed and hot work tools and dies are drawn at higher temperatures than other tool and die steels.

If a liquid bath, such as salt or lead is used, work should be preheated. The shock of placing a cold tool into a liquid bath operating at drawing temperatures of 1000 to 1200° F may cause cracking, particularly if the work has nonuniform sections and sharp corners.

More Time—Tools and dies made of hot work and high speed steels are often drawn for a longer time than the lower alloyed cold work compositions. Reason: The retained austenite, characteristic of these highly alloyed steels, must be transformed to martensite during drawing.

The rate of cooling from drawing temperature is also important because the austenite transforms to martensite on cooling. Because of this, two or more tempering operations are advisable.

This assures that all martensite, whether formed on the initial quench or during the first draw, is thoroughly tempered.

Hardness Affected—Fig. 4 shows the effect of drawing temperature on hardness. With increasing temperature, hardness remains constant up to about 900° F, then increases slightly at about 1000 to 1050° F, and finally falls off rapidly and in a continuous manner at higher temperatures.

Fig. 5 shows the red hardness of this hot work steel decreases in a regular fashion with increasing testing temperature. Because the properties indicated in these charts were obtained on fairly small specimens, some caution must be used in their interpretation for larger sections.

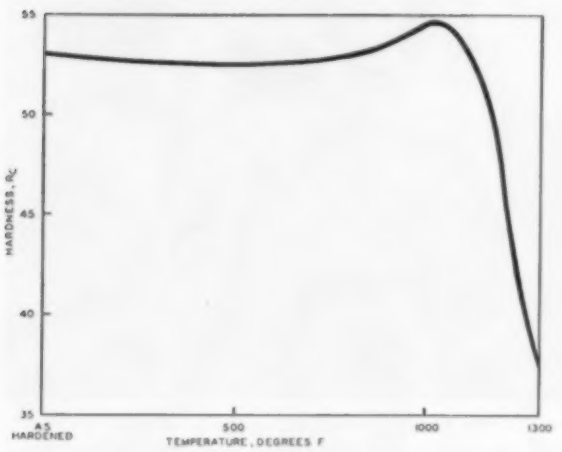


Fig. 4—Effect of drawing temperature on room temperature hardness of hot work steel

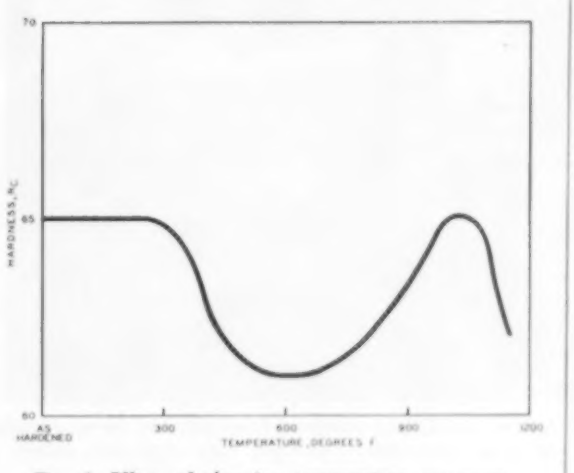


Fig. 6—Effect of drawing temperature on room temperature hardness of high speed steel

Two Peaks—Here's another point: If this analysis is oil treated from the lower temperature of 2100° F, it shows two toughness peaks. One is at 600° F and the other at 1100° F, with practically the same as-drawn hardness as is obtained when the steel is oil treated from 2175° F.

But keep in mind that although the use of a lower hardening temperature gives better toughness at operating temperatures at about 1100° F, there is a definite loss in red hardness.

The opposite effect occurs when hot work tools and dies are heat treated from the high side of the hardening range, which for this composition is 2225° F.

Secondary Hardness—High speed tools are drawn at 1050° F to develop secondary hardness required for most cutting tools.

Let's examine the effect of drawing temperature (in the vicinity of 1050° F) on the room temperature hardness, toughness and red hardness of the typical high speed steel (Fig. 3) when oil treated from 2200° F, and drawn for 2½-hours.

Fig. 6 shows that as drawing temperature increases, hardness decreases slightly. It has a minimum at about 600° F, rises to a maximum at 1050° F and then drops off rapidly.

Toughness increases up to 400° F, then decreases slightly and finally reaches a peak at 850° F.

Now, let's look at red hardness. Fig. 7 shows that as the testing temperature increases, red hardness decreases. This change is slowed up to about 1000° F, but rapid at higher temperatures.

Helps—Though this type high speed steel generally is oil treated from 2200° F, if the temperature is boosted to 2275° F, the cutting properties are noticeably better. Reason: More carbon is dissolved in the austenite. This gives higher room temperature and red hardness, though some toughness is lost.

On the other hand, tools oil treated from 2175° F show substantially higher toughness at a slightly lower room temperature and red hardness than those that are hardened from 2200° F.

The advantage of double drawing compared to a single draw is the relief of stresses caused by the formation of martensite during cooling from the first draw.

This usually gives higher toughness at about the same hardness as indicated in the preceding charts, particularly if the second drawing temperature is in the lower range of about 700° F.

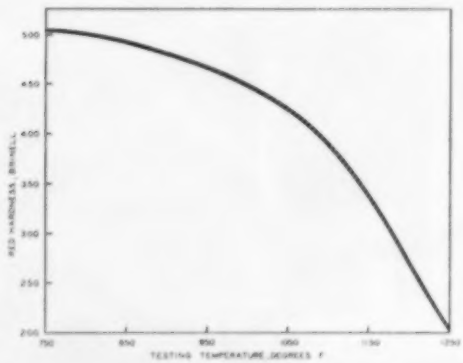


Fig. 5—How temperature affects red hardness of hot work steel

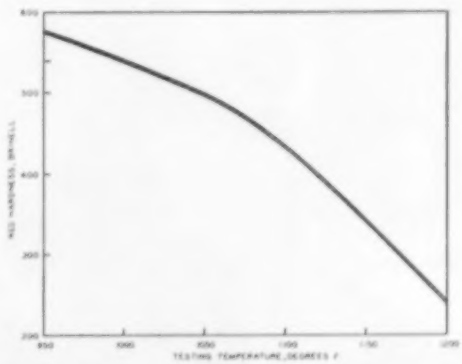
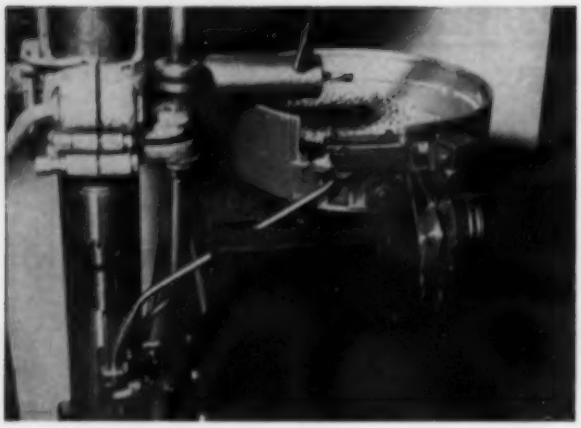
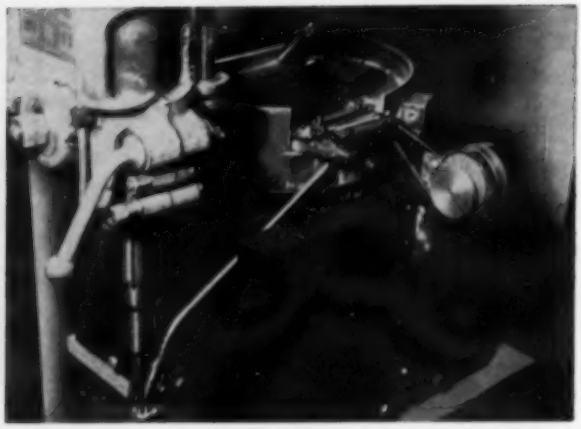


Fig. 7—How temperature affects red hardness of high speed steel





Screws loaded into aluminum bowl attached to top of Syntron vibrator travel upward along tracks on side of bowl to roller mechanism. At right, they move onto rollers, travel to grooves and drop "feet first" into feeder tube

Hopper Keeps Screws Moving

IF YOUR operations include the hand placing of headless setscrews, take a look at how one manufacturer solved the problem of hopper feeding them.

Screws start from a vibrating bowl which runs them end-to-end upward in a spiral track on the sides of the bowl to a roller mechanism. To keep from pinching the screws, rollers revolve in opposite directions. Screws ride along the roll until they hit a groove, which serves as a guide, and then drop "feet first" into a tube which feeds a screw-driving jig.

Modification—To make cup, flat or oval headless screws work in the feeder device a few thousandths of an inch must be taken off the diameter of two or three threads. This averages 0.005 in. on a screw ½-in. long and meets most standard tolerance requirements. Screws with cone, dog or hanger points seldom need modification.

For Set Screw & Mfg. Co., Bartlett, Ill., developer of the device, the new hopper feed means:

1. Tenfold speed up of the manual rate of 300 to 400 screws an hour.

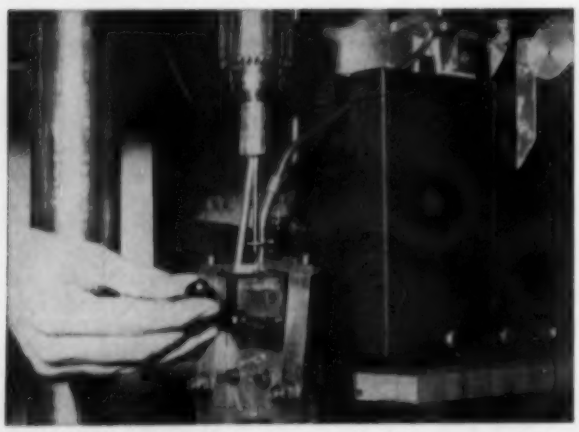
2. Rejection of screws of wrong diameter and length. They no longer go into the part.

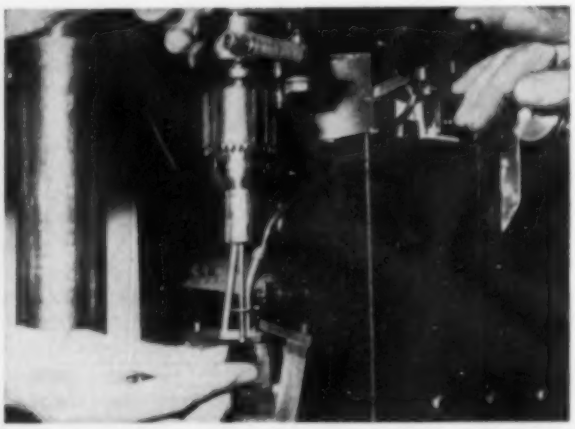
3. Reduction of human element problems, such as floor loss and crossthreading.

4. Smaller inventory and savings in floor space.

Where It's Used—A most promising application of the device is the placing of screws in knobs, such as control knobs on radio and television sets, and particularly on time-consuming assemblies. The unit can be adapted to fit any type drill press as well as other driving equipment.

Officials see many other uses for the device: Orientation of pins for automatic insertion, orientation of screws for secondary operations like thread grinding and similar applications.





Screws drop from tube to jig. At right, operator places knob on jig and pulls drill press handle, driving screw in knob

a CMP cost cutting report

ON INTRICATE PARTS

CMP
COLD ROLLED STRIP STEEL

reduced manual and operation costs ...increased production

BEFORE

This manufacturer of intricate machine parts had numerous fabrication problems with standard specification cold rolled strip steel. First, the gauge tolerance variance presented difficulty when finished parts went to assembly where a close fit was required, causing many rejects. Production slow-downs were frequent and costly. Die life was shortened, too. Even though the parts are small and produced in great quantities where cost of steel per piece is insignificant, the resulting finished product cost was mounting because of the difficulties and added manual work.

AFTER

Presenting the CMP story of "specific specs" to the purchasing department of this manufacturer, a CMP representative was invited to meet with their production management. He suggested several different specifications for the various items they were producing and arrangements were made to test run the "specific spec" steel for their own check.

Improved results were immediate and final specifications for all items were established as best for each job. As was later related, the production chief said, "While our steel cost went up, we so completely beat our production and assembly problems that those savings dwarfed the steel cost." Perhaps there is an answer for your requirements, too, in CMP "specific specs" cold rolled strip steel -- we'll be glad to explore it with you.

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This $32,000 press column was salvaged with $3000 worth of thermit weld

Welding Lengthens Mill Equipment Life

It used to be just a hurry-up repair tool when something broke down. Now it has added a host of routine maintenance and rebuilding jobs to its repertoire

Braze welding fixed this cast iron gear casing at a fraction of replacement cost

MAINTENANCE welding in steel plants has assumed a much broader role as a result of experience gained in the hectic years of peak operation. A big lesson learned while battling rapid deterioration of facilities was that welding could add life to equipment thought to have seen its last days.

Using this pretty much as his premise, Theodore Gaynor, supervisor of Bethlehem Steel Co.'s mechanical department at Johnstown, Pa., told the Midwest Welding Conference at Chicago how welding had saved production time and dollars. The welder, he pointed out, is an indispensable member of the maintenance and repair crew, working in every section of

Domes . . . "tailor-made" domes of Armstrong Insulating Fire Brick cut installation costs as much as 25%

Precision-cut at the factory, Armstrong "tailor-made" domes can be laid up so quickly that bricklaying costs go down by as much as 25%. Each carton and course is marked for fast identification. These domes simplify furnace design and provide high strength and structural stability. To make up a "tailor-made" dome, Armstrong engineers need to know only the diameter, rise, thickness, and type of brick to be used.

Send for free booklet on Armstrong Insulating Refractories. Address Armstrong Cork Company, 2703 Reed Ave., Lancaster, Pa. If you have a problem involving the use of insulating fire brick or refractory cements, just call your nearest Armstrong office. We'll be glad to help you.

Armstrong INSULATING REFRACTORIES

the steelmaking plant.

The Big Jobs—Thermit welding is an old process, but when mill equipment and heavy machinery are damaged, it's still the most consistently successful method of getting the machines back in production. Practically all the preparatory work is eliminated; the surface is merely wire brushed. No machining is necessary.

Take the 24-in. forged steel press column shown in the first photo. It's 30 ft long and failure usually occurs at its ends, originating at the root of the threads. With thermit welding, a 3 to 4-ft section of previously broken column is added to the main portion.

Since the column is nickel steel, nickel steel thermit mix is used. This job took about 1200 lb. The column is heat treated after welding to restore original properties. Cost is about $3000 for repairs as against $32,000 for a new column. Some repaired columns have been in operation many years.

Stud Welding — An interesting job for stud welding was the installation of crane rails for the charging machines in the open hearth shop at Johnstown. The 171-lb rails had to be clamped to steel plates by clips placed at 1½-ft intervals. Each clip is held in place with two ¾-in. threaded studs.

Approximately 12,000 studs were driven in the complete installation. The welding operation saved the laying out and drilling of that many bolt holes. The installation proved so satisfactory that an 11,000-stud job was done in the blast furnace yard.

Hard Surfacing—Hard facing of parts subject to wear is a comparatively recent development in steel mill maintenance operations. Many items are routinely surfaced, including mill coupling boxes, spindles, bucket lips and teeth, side guards and mill roll guides. Increase in service life of three to ten times is not uncommon. New surfacing alloys are continually being developed which may even increase this wear resistance.

Manual arc techniques for applying the alloy are still the most flexible and useful, but the introduction of submerged arc processes has greatly speeded up metal deposition rates on many jobs. Oxy-acetylene techniques are still used frequently.

Using submerged arc deposition, for instance, mill table rollers have been surfaced with an inexpensive facing alloy. Where rolls formerly lost 1½-in. on the diameter after 1¼-million tons of ingots, the same rolls lose only ⅜-in. after handling the same tonnage.

Old Stand By—Despite all the developments in automatic welding, the manual stick electrode process is still the most versatile. Not too long ago, a hot-blast valve casting on a blast furnace developed three major and several minor cracks in the casting wall. There was no spare and a new one cost $6000.

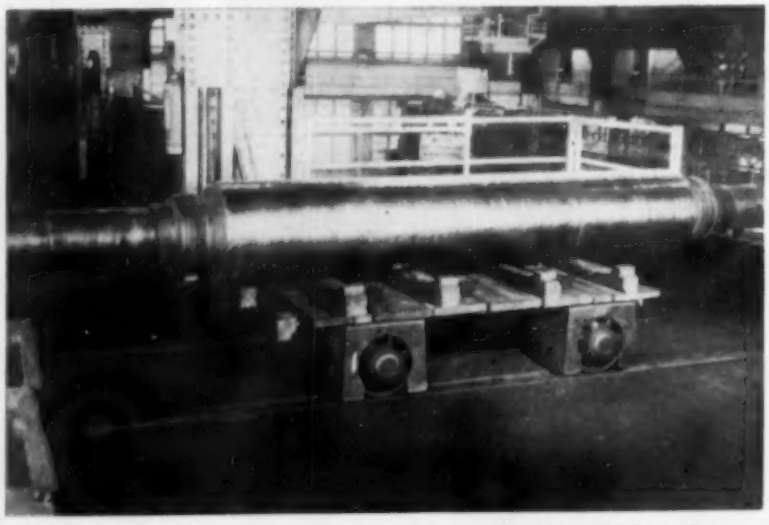
Cracked areas were first prepared for welding by flame beveling, and the casting was reassembled and held to shape with jigs. Prepared areas were welded with 250 lb of low-hydrogen electrodes, deposited in 190 welding hours. Casting was annealed and then machined. Cost of the repairs was $550, or less than 10 per cent of the replacement cost.

Newcomers — Resistance and inert-gas-shielded welding methods are coming into play in steel mill maintenance, too. Medium-powered resistance spot welders are doing many jobs formerly handled by soft soldering and cold riveting. Savings in such things as containers, framing, fabrication of various types of screening, etc., have more than justified the higher initial cost of the equipment.

In this instance weld metal is built up to reduce the working passes of a 48-in. blooming mill roll. Job was done with submerged arc method

The gas-shielded methods have proved themselves in such jobs as rebuilding bushings with aluminum bronze. The weld deposit is dense, free from porosity and thoroughly fused to the steel base metal.

In a different type job, copper rivet heater elements are repaired efficiently with the inert gas process. Worn elements used to be rebuilt by oxy-acetylene welding which required preheating and tedious metal deposition. Using deoxidized copper wire, the job is done in half the time and weld quality is improved.



Submerged arc works well in hard-surfacing mill-table rolls like this one

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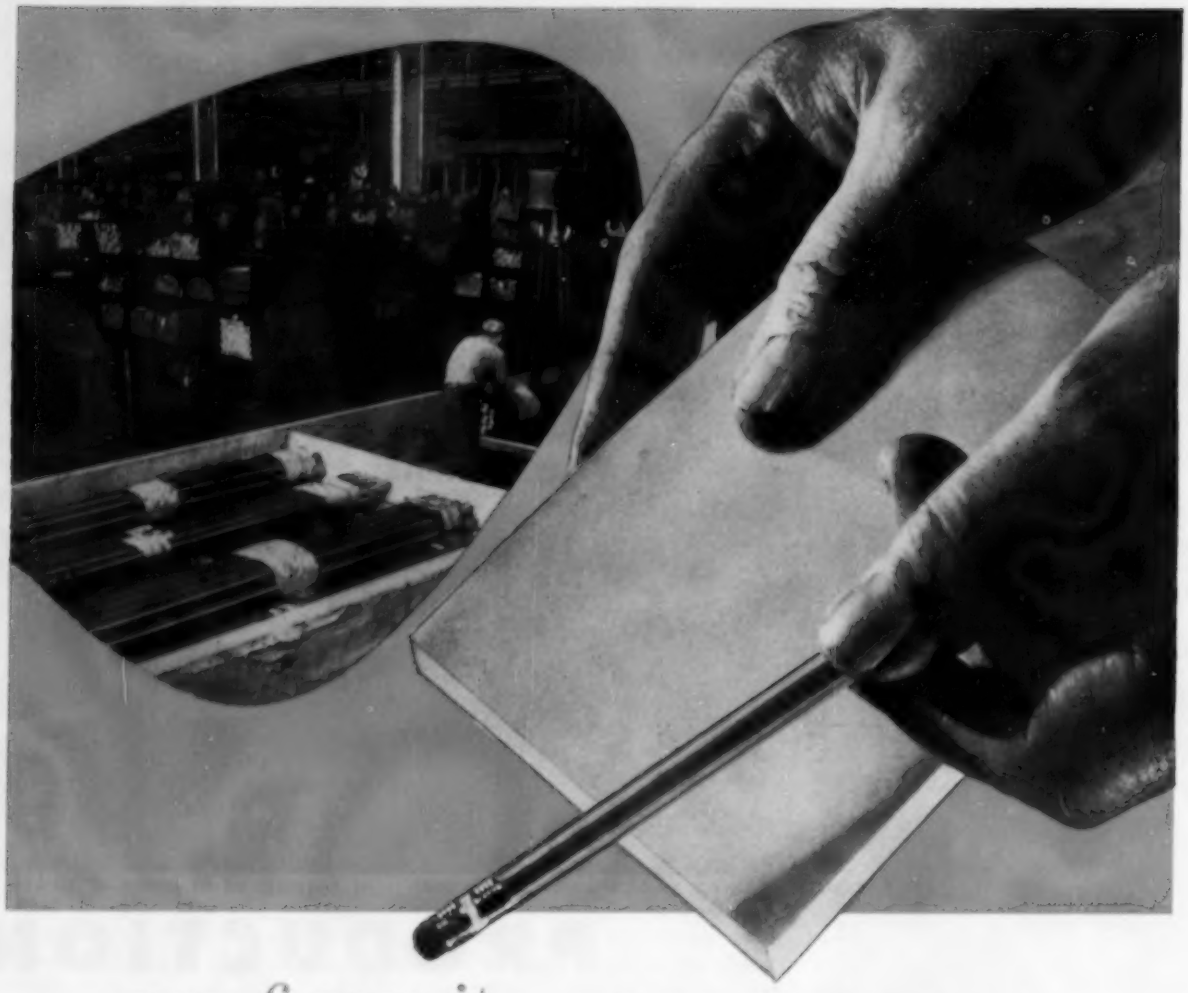

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Titanium Tamed for High-Strength Bolts

WOULD YOU pay $11.20 for this ½ x 2¾-in. internal wrenching bolt? Plenty of aircraft companies will, even though they cost nearly $100 a pound in production quantities.

The bolt is made from 4Al-4Mn titanium alloy and has endurance strength 25 per cent greater than high-strength steel although it weighs only 57 per cent as much. That makes its fatigue strength, pound for pound, more than double that of high-strength steel.

Time and Effort—It didn't get that way by accident. The company that made it poured upwards of $500,000 into titanium bolt research, and it took 40 men 30 months to come up with the answer you see at the top of the page.

Why all this effort behind one bolt? The answer lies rather plainly in the strength for unit weight figures given above. If you can save a pound of weight in a plane, you can lighten the structures needed to support that pound in the first place. Then you can carry more fuel, which means a greater cruising radius or greater payload.

Military Blessing—The Air Force foresaw this a number of years ago when it began urging contractors to use titanium to save weight, with the idea of familiarizing them with the metal. It agreed to assume additional costs. The policy is still in effect to some extent, but the familiarization era is about over.

Now we are getting to the point where titanium must compete on its own merits with other well-entrenched materials (whose manufacturers aren't sitting on their hands). Savings in weight must be backed by high strength and unquestioned endurance.

Certainly, there is plenty of opportunity. In fasteners alone Douglas Aircraft estimates that a large transport uses 535 lb of screws and bolts, a large fighter 443 lb, a smaller fighter 103 lb. This is in addition to all the sheet, forgings and fabricated parts where titanium can compete if the price is right or military necessity demands.

The Race—So the great titanium sweepstakes is on. Standard Pressed Steel Co., Jenkintown, Pa., claims it leads the field over the first hurdle with its Hi-Ti bolt (at left). What it has taken to run out in front, and what that company has learned about titanium in the process is worth passing on.

Titanium is perverse. That SPS found out early and is still finding out. The perversity starts back at the incoming bolt stock. At best, it has a narrow spread between ultimate and yield strengths and a low modulus of elasticity. To keep stock variables within usable limits, rigid quality control of incoming materials had to be the first step.

Each incoming lot is now tension tested to catch any material contaminated with embrittling agents. Then, even though the stock is centerless ground, each lot is given a fluorescent penetrant inspection for surface defects.

Surface—This is jumping ahead in the story, but when the first bolts produced by SPS failed miserably in fatigue, a good part of the trouble was found to lie in surface finish. Titanium is notoriously notch sensitive and the slightest imperfection in the finish acts as a focal point for stress build-up. Hence the fluorescent inspection.

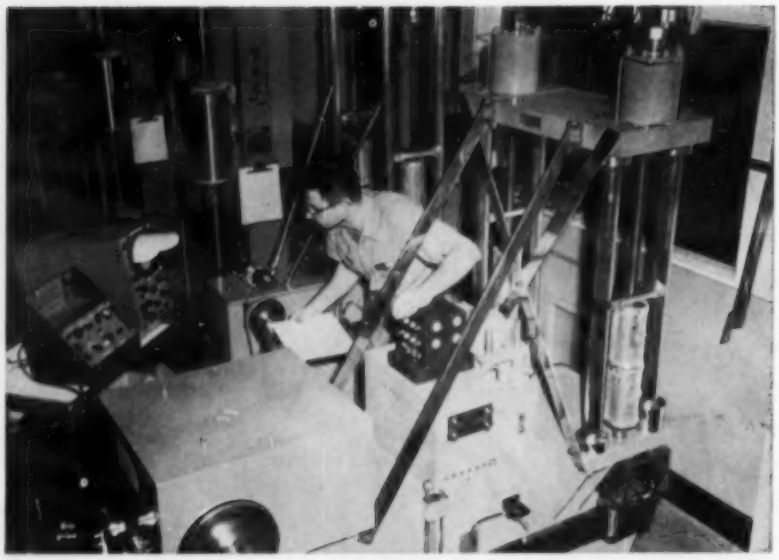
Before testing, each completed bolt is now given a finishing treatment which produces a surface smoother than 8 microinches. It's not for looks. Half the secret of the fatigue life of these bolts lies in the mirror finish.

Forging—But before a bolt could be made, the right forging technique for the head had to be developed. Cold forging was out—the metal shattered. Hot forging success came with special tooling and heating equipment which kept the metal in the critical temperature range and prevented it from developing hot spots. Hot spots were a major problem because they produced grain coarsening with resulting loss of fatigue strength.

The fillet area around the head gave particular trouble. It had to be designed and redesigned to get the right grain flow.

Thread—Then there were the threads. They are rolled, but here, too, grain flow created problems that cut fatigue life. SPS cut thread rolls in its own shops until it found a design that produced grain flow without irregularity, especially in the thread root area where bolt cross section was smallest.

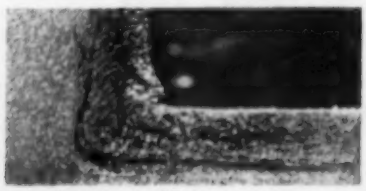
Only then were bolts produced which consistently passed the acid fatigue test—100,000 cycles under 77,000 psi load before failure. This put the titanium bolts in a class where they could compete successfully with military specification steel bolts which call for an average performance of 65,000 cycles at this loading, with no test sample failing sooner than 45,000 cycles.



Battery of fatigue testing machines employed by Standard Pressed Steel Co. to stress bolts repeatedly with dynamic loads. Machine in foreground stresses two ½-in. bolts at a time with 800 load applications a minute

Steel Facts, Too—Some further idea of the work involved in developing these bolts can be gathered from the testing program. The fatigue-testing equipment employed was capable of stressing a ½-in. bolt 800 times a minute. Determining just three points on the S-N curve (stress vs. number of cycles) for two titanium and four steel bolts required close to 1200 hours of test machine time. Testing has been carried to the point where complete S-N curves for both titanium and steel ½-in. bolts are included with each shipment of the new bolts.

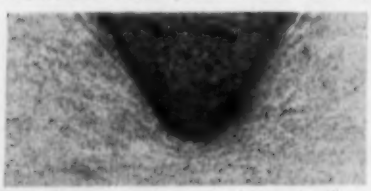
Imperfections in thread root area . . .



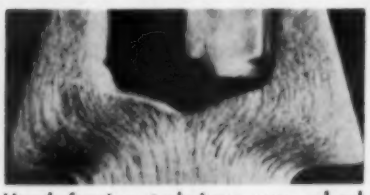
Irregularities in fillet area . . .

Promoted thread area failures until . . .

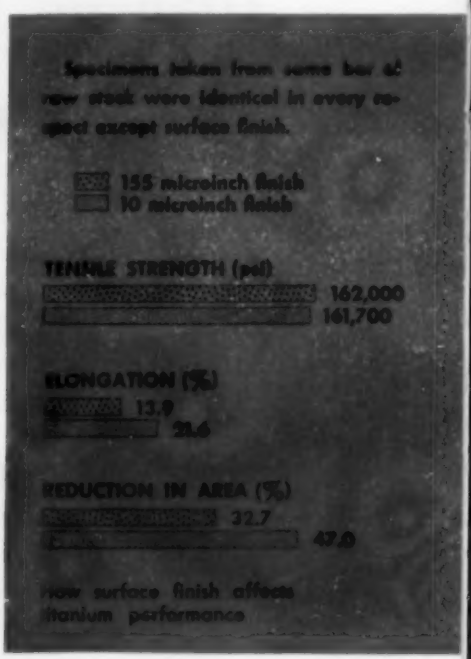
Showed up in early failure until . . .



Redesign brought smooth grain flow



Head forging technique was solved



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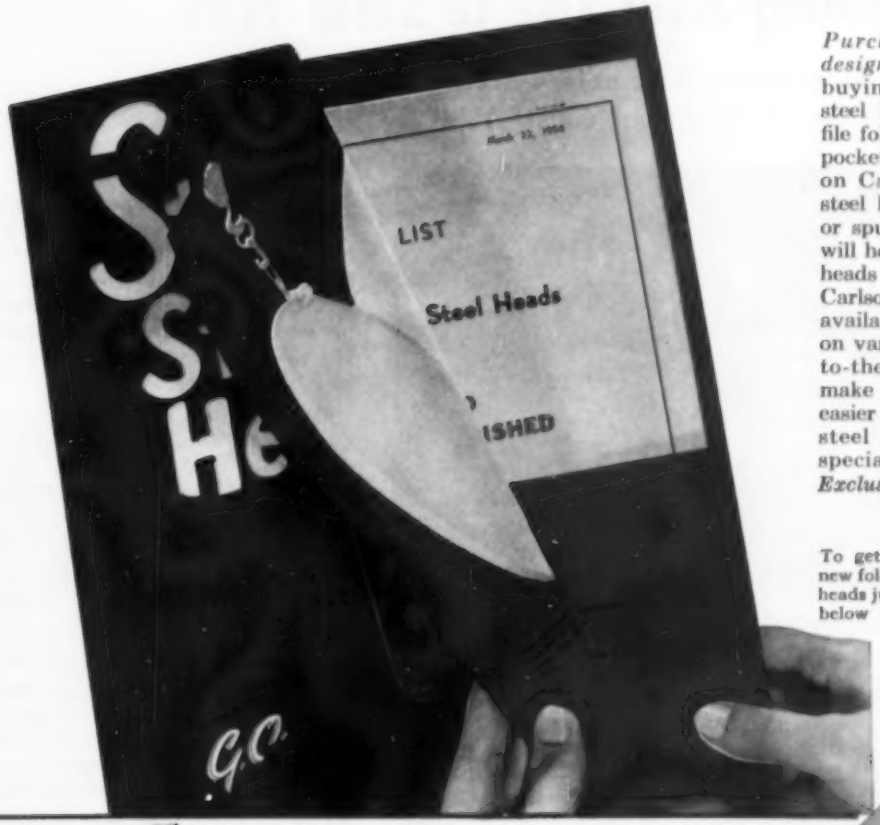

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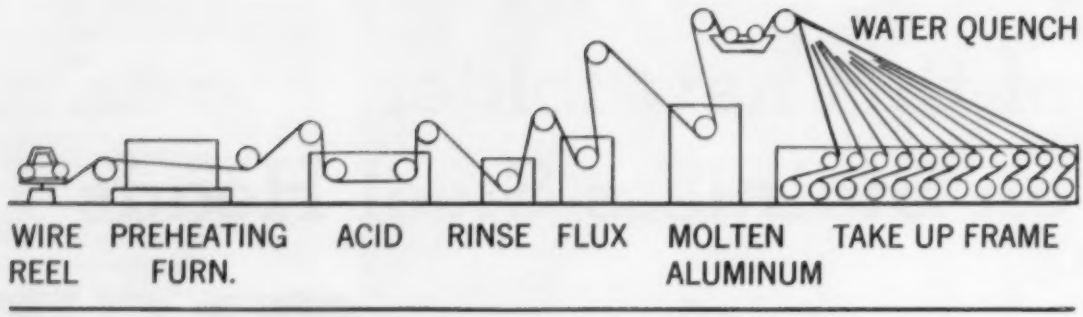


Here's what the schematic drawing looks like on the continuous line at Page Steel & Wire. Key items are the flux and the vertical exit from the aluminum

Aluminum Coating Adds Life to Steel Wire

Corrosion resistance compares favorably with other coated products and it holds up under 1300°F

Barbed wire is one of many products manufactured from the aluminized wire

ADD aluminum-dipped wire to the list of corrosion and heat oxidation resistant materials. Coated sheet and strip have been on the market for years, but only recently have processes been developed for iron and steel wire.

To the user it means a product that generally matches galvanized wire in ductility and adherence. Outdoor corrosion resistance is outstanding; aluminum coatings stand temperatures up to 1300° F.

Two Ways—Some hot-dip aluminum coating processes utilize controlled gaseous atmospheres to protect the cleaned metal surface from oxidation until the immersion in molten aluminum. The patented process of the Page Steel & Wire division, American Chain & Cable Co., does the same job with a fluxing action of complex salt compounds applied from a hot aqueous solution.

Economical and practical from the production standpoint, the American Chain process includes: Preheating, cleaning and pickling, rinse, application of flux, immersion in molten aluminum and a water quench.

Pretreatment — Because surface cleanliness is so vital, the first step in the line is a preheating furnace. Not only does it remove residual drawing lubricant, but the heat imparted to the wire accelerates the action in the cleaning and pickling sections that follow. Furnace temperatures are set according to wire size, speed of travel, length of furnace, etc.

Best results in cleaning and pickling are obtained with hot hydrochloric acid solutions, with temperature and concentration again being suited to wire size, speed, etc. A hot water rinse then removes iron salts and any dirt that may still be clinging to the wire surface.

Fluxing—This is one of the keys to the success of the process. The flux is a hot aqueous solution of zirconium or titanium fluorides or complex zirconium or titanium fluoride compounds with an alkali metal, such as sodium or potassium. The temperature and concentration are adjusted to the diameter and speed of the wire.

Flux temperatures are kept high enough to dry the flux coating on the wire as it comes out of the bath. The coating must be completely dry before the wire passes into the molten aluminum bath to avoid agitation of the aluminum at

the point of entry.

Now the Aluminum—Molten aluminum is contained in an alumina-brick-lined furnace heated by low frequency induction current. Refractory life is long. Induction current keeps the metal temperature uniform, and there is no dross sediment collected on the bottom of the furnace.

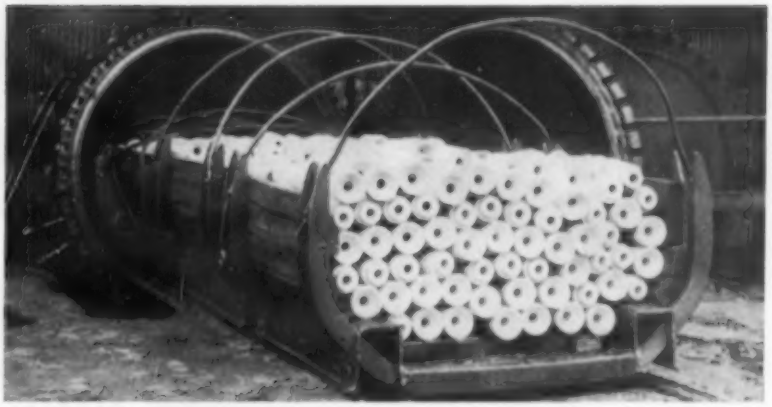
Wire enters the bath, passes under a suitable sinker and leaves the bath almost vertically to assure the uniformity of coating. Time of immersion in the 1200 to 1400° F aluminum, of course, determines the thickness of the aluminum-iron alloy layer formed.

Ductility Good — Ductility and adherence, the two most troublesome problems in any hot-dip metal application, have been appraised by the wrap test. Coating technology has been adjusted so that all wires will pass the one diameter test: It is wrapped around a mandrel no bigger than itself.

The aluminum coatings are duplex in nature, consisting of an alloy layer resulting from a diffusion process and an outermost layer having a composition similar to the bath. The latter is characterized by a cast structure and the alloy layer is hard and brittle. Beryllium and silicon additions can reduce alloy hardness, and thus improve ductility, but the toxicity of beryllium practically eliminates it as a possibility.

Coating Characteristics—Silicon additions up to about 2.5 per cent are the maximum. While ductility is improved by controlling hardness and thickness of the alloy layer, the outermost layer is important, too. It should consist of a fine-grained matrix of aluminum or aluminum alloy, similar in composition to the molten bath, with the aluminum-silicon-iron or aluminum-iron compound well distributed as fine particles.

Size of the wire also exerts an influence on coating characteristics. For a given speed of wire travel, the larger the wire size the heavier or thicker and the more irregular may be the applied aluminum coating. In general, heavy or thick and relatively irregular aluminum coatings on the larger sizes of wire show a tendency toward brittleness.



Tramcar of nozzles is ready to be pushed into pressure-treating cylinder

Wood Process Aids Steelmen

ADAPTING a major process of the wood-preserving industry helped steel producers solve a metal-pouring problem. Ceramic nozzles for bottom-pouring ladles can be more uniformly impregnated with a heavy tar in pressure cylinders used to treat wood.

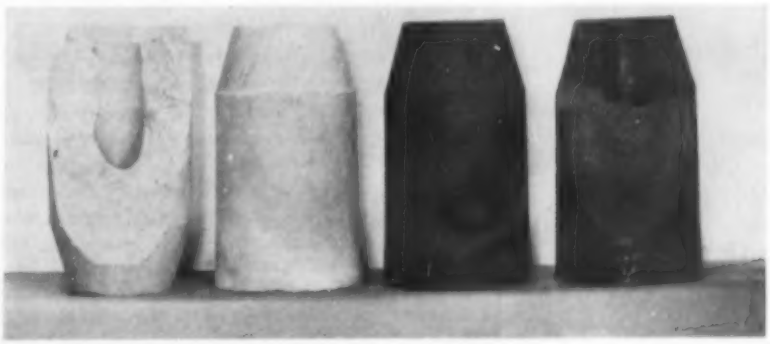
Before Koppers Co. Inc. came up with this answer, some steelmen prepared nozzles by boiling and baking them for several days in a tar solution. This treatment was not uniform. Nozzles often wore away unevenly or cracked after pouring started.

Effect—An uneven flow through the nozzle results in the molten metal flaring out into thin ribbons which cool faster than the center part of the flow. This creates chills. As chills fall into the mold they do not remelt but cause imperfections which show up in the finished steel during rolling.

In the wood-preserving process, the material—a high coke residue tar—is forced into the porous ceramic nozzle under pressure. Thus treated nozzles are able to withstand the sudden application of high heat from the molten metal without spalling or breaking.

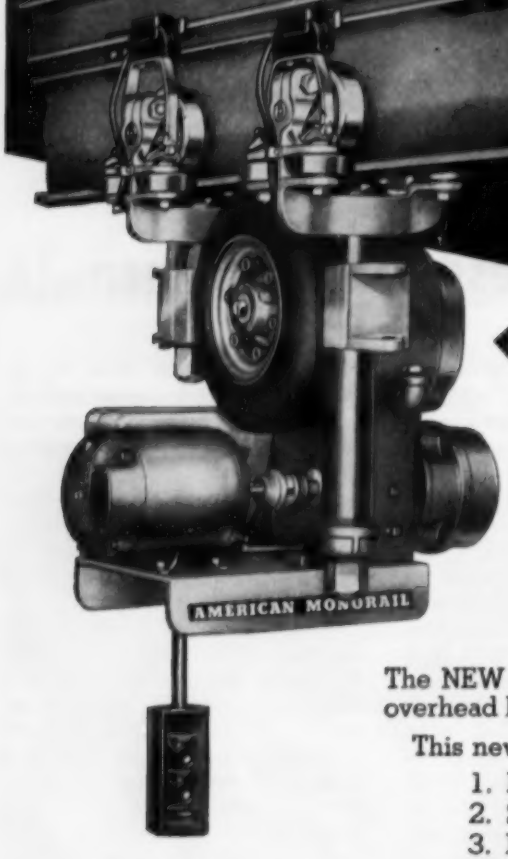
Advantage—The liquid metal (its temperature goes up to 3000° F) comes into contact with the treated nozzle and creates a chemical change in the tar. It becomes a hard-crusted carbon. The gas formed in the reaction acts as a lubricant between the nozzle and metal, which results in a more even flow into the mold.

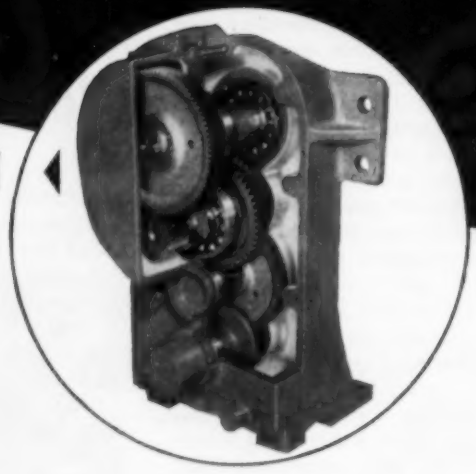
Handling costs are reduced because the delivered nozzle is ready for use.



Treated nozzles at right show penetration of the tar under pressure

NEW... AMERICAN MONOTRACTOR for Automatic Handling





The NEW American MonoTractor will fit precisely into any overhead handling system for automatic transfer of materials.

This new unit offers these advantages:—

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3. Horsepower Range for ¼ to 2 H.P.
4. Any Standard NEMA Motor.
5. Any Type Motor Brake Can Be Applied.
6. Operates on Any Smooth Flat Flange Track.

This precision built tractor unit offers continuous trouble-free transfer of any type of carrier for power propulsion. American MonoRail engineers offer wide experience in the application of these units. Let them help you solve your automatic handling problems.

AMERICAN OVERHEAD HANDLING EQUIPMENT

AMERICAN MONORAIL COMPANY

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[IN CANADA—CANADIAN MONORAIL CO., LTD., GALT, ONT.]

NEW PRODUCTS and equipment

Write directly to the company for more information

Hydroform Machine

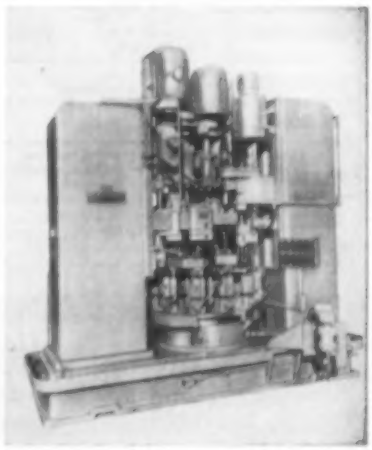
Hydroforming involves the use of a male punch and a flexible die member backed up by hydraulic oil pressure that may be controlled up to 15,000 psi. The flexible die member eliminates the most costly element of a normal die set and increases forming efficiency.

The machine will form parts from sheet metal blanks up to 8 in. in diameter with a maximum draw depth of 5 in. Almost all sheet metals in gages up to ¼-in. steel can be drawn. The maximum machine operating rate is 200 cycles an hour. The machine is self-contained, floor-mounted. It is 5 ft square, 7½-ft high and weighs 12,000 lb. It requires only water and electrical connections to be put into operation. Larger Hydroform machines are offered in 12, 19, 23, 26 and 32-in. capacities. The machine is said to produce a variety of small, deep drawn and formed parts at decided reductions in cost. Cincinnati Milling Machine Co., Cincinnati 9, O. Redwood 2121

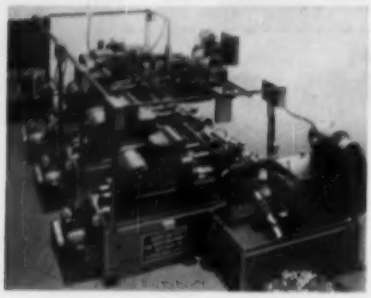
12-Station Vertical Indexing Machine

The machine bed and columns are welded steel construction. The machine, which has 34 spindles, operates at 31 seconds cycle time to produce 93 pieces an hour at 80 per cent efficiency. Two No. 5 automatic units are mounted vertically. A No. 2 unit is mounted horizontally on a rapid travel slide. An automatic lead screw tapper with reversing motor drives a 6-spindle tapping head.

Drilling, reaming and countersinking operations are performed by a 22-spindle, high-speed, pressure-lubricated head mounted to the first unit. Boring operations are performed by a 5-spindle head mounted to the second unit. The vertical drill units are powered by 10-hp motors, the tapper unit by a 5-hp reversible motor and the horizontal unit by a ¾-hp motor. Twelve holding fixtures are mounted on an independently powered, automatic index table with self-contained lubrication. Machine elements are electrically synchronized and arranged for pushbutton control. W. K. Millholland Machinery Co. Inc., Indianapolis 20, Ind. Glendale 2216



15-Station Transfer Machine



This inline-type machine utilizes standard machine units. The part processed (a refrigerator cylinder bracket) is produced from standard 3 x 2½ x ½-in. hot-rolled angle iron.

The machine units are hydraulically actuated and electrically controlled, including safety limit switches at each station. The transfer bar with pusher fingers is attached to the milling units. The bottom of the main base is open for a floor-type coolant sump and chip conveyor. The work is located and hydraulically clamped at each station. A tool board is provided for automatic tool cycle control, tool storage and presetting gages for all tools. Motch & Merryweather Machinery Co., 888 E. 70th St., Cleveland 3, O. Main 1-1000

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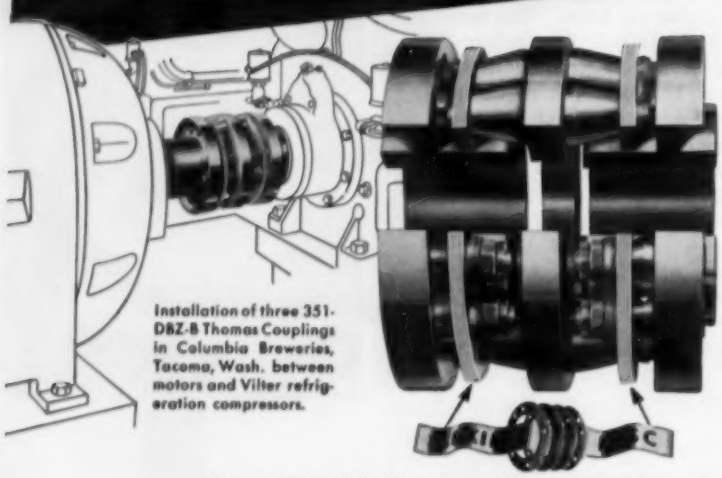
for more years of better service!

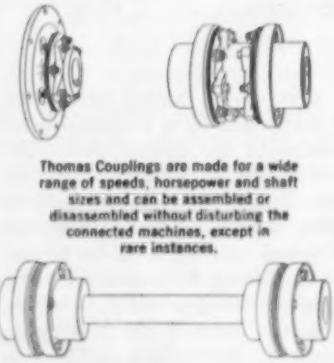


Installation of three 351-DBZ-B Thomas Couplings in Columbia Breweries, Tacoma, Wash. between motors and Vilter refrigeration compressors.

Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

DISTINCTIVE ADVANTAGES

FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



Thomas Couplings are made for a wide range of speeds, horsepower and shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.

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Assembling Square Blocks Into Working Gages

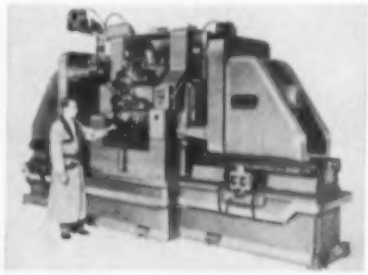
Along with the addition of square gage blocks to its line of gaging equipment, this company has developed a system of square block accessories designed to extend the use of square gage blocks for inspection tasks. Their finish contributes to easy wringability, minimizes wear and assures longer life. The blocks can be calibrated with great accuracy.

The new system of accessories can be used with all standard square blocks. It provides for ease of assembly in a variety of gages. Indicating gage assemblies permit inspection by indication rather than "feel." The photo shows an inside caliper gage being assembled. Note the V-block arrangement for holding the pins and the milled ratchet teeth on the tie rods (in hands) for quick adjustment of length. DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill. Vanderbilt 4-1122

Double End Drilling and Assembly Machine

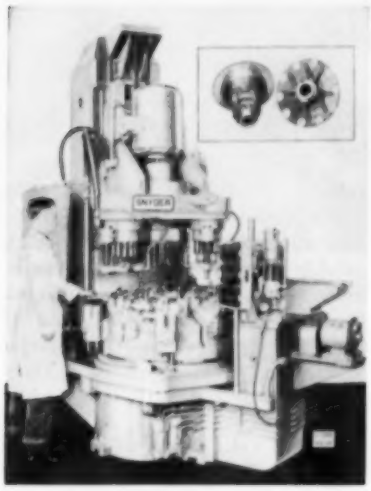
It has a trunnion-type automatic index table which is mounted in a vertical plane to save floor space. All operations, both production and assembly, are fully automatic. Production is 120 manifolds per hour, with bushings and pin in place.

All units are hydraulically operated. Lubrication is automatic. Ways are hardened and ground. Vickers controls are used on the hydraulic pump and control panel. JIC construction is followed throughout. To change parts or models, the center section is easily accessible for conversion or retooling. Michigan Drill Head Co., P.O. Box 4643, Detroit 34, Mich. Jordan 4-5841



Special-Purpose Machine

The 5-station, vertical index machine drills, spotfaces and reams ten flange holes in either of two similar differential carriers of malleable iron. The change from one part to the other is through a fixture designed for adapter change. The part is loaded manually at station No. 1 and clamped hydraulically. Unloading is done with cam-operated, scissors-type fingers which swing over the fixture, grip the part around the bearing hub, lift it out of the fixture and deposit it on a pair of rails beside the index table.



Tools are high-speed steel, with a speed of 80 sfm and a feed rate of 7 in. a minute. Tools and adjustable adapters can be exchanged as an assembly to provide for tool length preset. The unit moves on flat hardened and

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NEW PRODUCTS and equipment

ground slide ways. The index table is hydraulically operated. Coolant is supplied from a tank mounted beside the machine. Lubricant is manually controlled. Required floor space is 146 x 72 in. Snyder Tool & Engineering Co., 3400 E. Lafayette, Detroit 7, Mich. Lorain 7-0123

Electronic Gaging of Small Parts

You can make a relatively inexpensive gaging device with this regular gage head cartridge. It is to be used where small parts must be accurately gaged in quantity.

The photograph illustrates a straightforward application. The cartridge has been set at an angle for increased visibility, and a resultant increase in the speed with which small parts can be gaged. The cartridge can be positioned quickly for measurements over a 2-in. range. The anvil, which is threaded into the base, has a range of ¾-in. Brown & Sharpe Mfg. Co., Providence 1, R. I. Dexter 1-5000

Flow-Level Platform Scale of 500-Lb Capacity

The scales can be set in a pit 10½-in. square and less than 12 in. deep. A variety of instrumentation can be used with the scale, including indicators, recorders and control equipment. They incorporate a single SR-4 load cell of the compression type. SR-4 bonded resistance wire strain gages are the load sensing ele-

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NEW PRODUCTS and equipment

ments. The cell supports a platform on a short column which is held vertical by two sets of radial flexure straps. Accuracy of weight is assured by permitting only vertical application of load, regardless of the location of the load on the

platform.

Principal advantages of the elecrical weighing are cenralized, remoe indicaions of loads and simpliciy of use in an automatic control system. Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa. Saratoga 9-9161

Roughing Cutter

The roughing cutter has five carbide-tipped blades for every inch of diameter. Manufactured in diameters from 4 in. up, it is expected to have wide applications in industries where cast iron is milled at high feeds. High feed rates and longer tool life are achieved by a principle of placing

blades close together and the company's patented, free - cutting, shearing action. Ingersoll Milling Machine Co., Rockford, Ill. Rockford 3-6461

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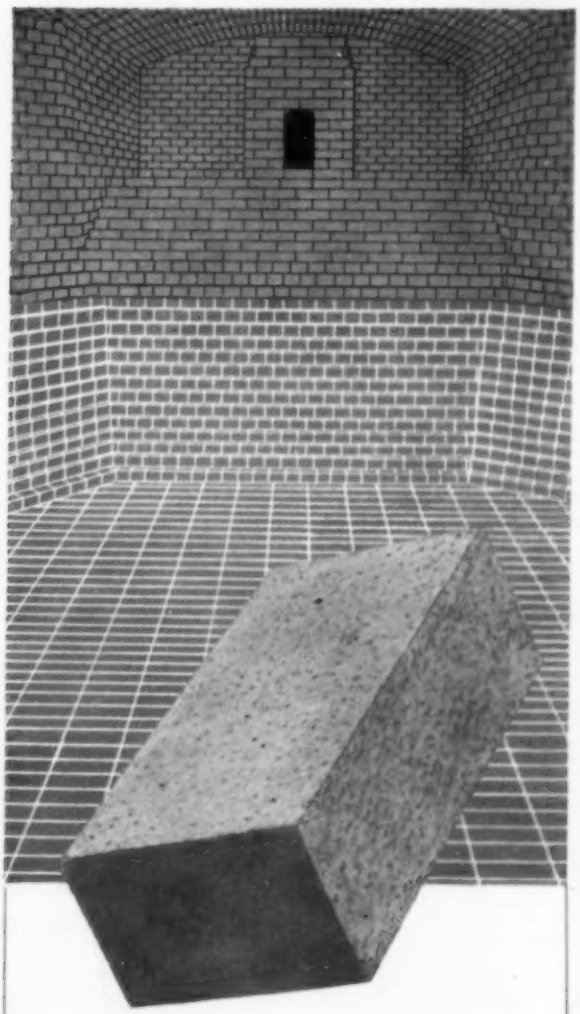

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Chrome-Periclase "A," plain and metal-encased for open hearth back walls, front walls.

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7. **Great volume stability**
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All of these eight properties—outlined by major steel company ceramists as most desirable for sub-hearth brick—are found in Permanente Periclase D-S Brick.

This superior brick has been *designed especially* to withstand sub-hearth conditions—thus gives maximum protection against costly breakthroughs, gives longer sub-hearth life.

High MgO (more than 95%) is achieved through the use of pre-shrunk, accurately-sized Periclase grains derived from sea-water magnesia. Absence of chromite eliminates the reduction of chromium oxide when the sub-hearth may be in contact with the bath or when carbon monoxide penetrates to the sub-hearth.

Low iron oxide minimizes refractory damage through alternate oxidation and reduction of iron oxide and other iron compounds. Low calcium prevents damage caused by slaking during slow heat-ups or while furnace is idle.

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Just completed, this catalog illustrates and describes the various types of Cleveland machines used in the fabrication of plates, bars, angles, beams, girders and other structural shapes.

Should you desire additional information on any of the machines you'll find in this book, we'll gladly furnish you with it promptly.

PUNCH and DIE CATALOG No. 12

Here you'll find a description of the Cleveland System of Standardization which allows you to use economical standard rather than costly special punches. Its outline of the proper care of punches and dies will help reduce your replacement cost. It lists and illustrates all standard and special Cleveland Punches and Dies available for every make of punching machine and press. AA-377

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NEW Literature

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Milling Cutters

This catalog desecribes face-milling cutters, types A, H, J, L and C. It includes charts showing the specifications, applications and catalog number of each type—catalog 31, 43 pages. Lovejoy Tool Co. Inc., Springfield, Vt.

Universal Joints

This catalog covers applications, engineering data, models and sizes, proper joint selection, etc. Constant velocity, the principle on which the joints are designed, is described and illustrated—Gear Grinding Machine Co., Joint Div., 3901 Christopher, Detroit 11, Mich.

Metal Lath Membrane

Complete information on metal lath membrane fireproofing for steel structures is given in this technical bulletin—No. 3, 15 pages. Metal Lath Manufacturers Association, Engineers Bldg., Cleveland 14, O.

Taps and Dies

Balanced action taps and dies are illustrated and described—catalog 22, 32 pages. Winter Bros. Co., Rochester, Mich.

Pipe and Tube Straightening

"How to Straighten Pipe and Tube" reviews tubing uses. Covering the general subject of straightening ferrous and nonferrous types, it details two basic methods—bulletin 55, 23 pages. Mackintosh-Hemphill Co., 901 Bingham St., Pittsburgh 3, Pa.

Presses, Die Casting Machines

This is a discussion of hydraulic presses and die casting machines. A comprehensive chart goes into types and most suitable production uses—condensed general bulletin 1.1. Lake Erie Engineering Corp., Box 68, Kenmore Station, Buffalo 17, N. Y.

Gunning Procedures

"Gunning Practices and the BRI Gun" discusses procedures for open hearth and electric steelmaking furnaces, miscellaneous steel plant operations and in foundry and copper industries—12 pages. Basic Refractories Inc., 845 Hanna Bldg., Cleveland 15, O.

Sprue Mills

They clean sand from foundry sprue so that only cleaned sprue is charged into the cupola. Benefits: Substantial savings in coke consumption, faster melting, less slag to handle and reduced deteriorization of cu-

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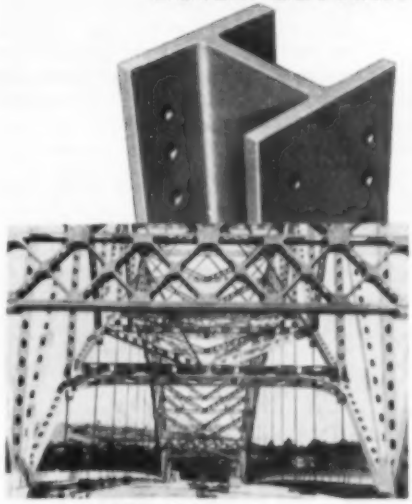

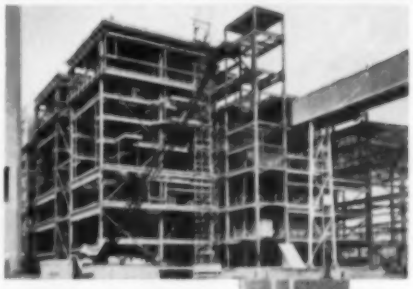

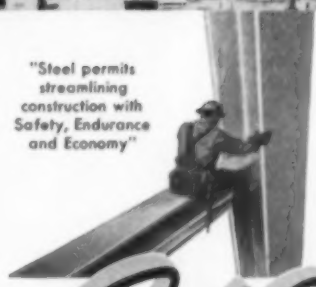

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NEW LITERATURE

pola linings. Dimensions are given on three standard sizes. Typical loading and discharging arrangements are illustrated—bulletin 112, 4 pages. C. O. Bartlett & Snow Co., 6200 Harvard Ave., Cleveland 5, O.

Lift Trucks

The company's newly designed hydraulic and mechanical lift trucks are featured — West Bend Equipment Corp., 343 Water St., West Bend, Wis.

Paper

A fact file on PTM tracing medium is offered. It contains working samples and lists benefits—Frederick Post Co., 3650 N. Avandale Ave., Chicago 18, Ill.

Plant Facilities

"This is USAIRCO" gives the company's history and describes its products and manufacturing facilities. Details on its line of heating, ventilating and air-conditioning products are included—12 pages. United States Air Conditioning Corp., 3300 Como Ave. S.E., Minneapolis 14, Minn.

Couplings

Ajax dihedral spindle shaft couplings designed for rolling mill service are described. Detailed design information and illustrations are included—bulletin 58, 6 pages. Ajax Flexible Coupling Co. Inc., Westfield, N. Y.

Storage Equipment

Steel shelving, lockers and other storage and maintenance equipment are featured in this catalog—23 pages. Precision Equipment Co., 3636 N. Milwaukee Ave., Chicago 41, Ill.

Cable Construction

This booklet covers the rubber-insulated Loxarmor-type cable. It is designed for use in racks or trays for applications where rigid conduit systems are unnecessary or undesirable—bulletin 1090, 32 pages. Okonite Co., Passaic, N. J.

Band Machines

The brochure covers this line of semiautomatic machines for sawing, filing, grinding and polishing. They feature hydraulically powered tables and controls—19 pages. DoAll Co., Des Plaines, Ill.

Grinders, Arbors

Bench grinders, arbors and sanding discs are covered. All products are cataloged and illustrated. Dimensional sketches are included—7 pages. Poly Products Co., 230 E. Pomona Ave., Monrovia, Calif.

Blast Cleaning

"Eight Steps to Lower Cleaning Costs" covers applications of abrasive blast cleaning to problems encountered in the steel milling industries and in industries concerned with the processing of steel mill products —bulletin 864. American Wheelabrator & Equipment Co., 1157 S. Byrkit St., Mishawaka, Ind.

Aluminum Protection

Alodine 1000, the finish that provides invisible protection for aluminum, is described—4 pages. American Chemical Paint Co., Ambler, Pa.

Hydraulic Line

The line, ranging from 17½-ton pullers to 100-ton presses, is covered in this bulletin—HY-55, 28 pages. Owatonna Tool Co., 398 N. Cedar St., Owatonna, Minn.

Alloy Steels

Alloy Steels Pay Off highlights the economic advantages of fabricating with alloy steels for improved weight-to-strength ratios in aircraft construction, bridges, electrical equipment, machinery, trucks and busses, etc.—200 pages. Climax Molybdenum Co., 500 Fifth Ave., New York 36, N. Y.

Rust Prevention

This catalog includes 98 product color chips, instructions for surface preparation and application of prim-

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NEW LITERATURE

ers, machinery and implement finishes, sealers, oil field finishes, thinning oils and floor and masonry coatings—Form No. 254. Rust-Oleum Corp., 2799 Oakton St., Evanston, Ill.

Cemented Carbides

The Carmet Division has begun to market two new cutting grades, CA-608 and CA-610. This catalog describes them in detail and outlines their applications—C-11, Allegheny Ludlum Steel Corp., PR Dept., Pittsburgh 22, Pa.

Industrial Products

The *Yellow Book* contains information on hose and fittings for designers of hydraulic and pneumatic control systems—132 pages. Weatherhead Co., 300 E. 131st St., Cleveland 8, O.

Gear Drives

Three lines are described, including 39 standard-size drives for vibration-free transfer of power, baseplates and built-in backstops—book 2619, 32 pages. Link-Belt Co., PR Dept., 307 N. Michigan Ave., Chicago 1, Ill.

Industrial Trucks

Sections on Elpar fork trucks, high and low lift platform trucks and crane trucks are included in this condensed catalog—8 pages. Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, O.

Pressure-Sensitive Tapes

The hundreds of ways pressure-sensitive tapes serve the metalworking industry are described. Illustrations show how 47 of more than 300 available Scotch-brand tapes can be used—56 pages. Minnesota Mining & Mfg. Co., Dept. P-537, St. Paul, Minn.

Polishing, Grinding

The "Production Digest" contains authoritative papers on coated abrasive grinding and polishing techniques—60 pages. Behr-Manning Corp., Dept. PD-54, Troy, N. Y.

Forgings

The company's forging, composite die section, weldment, machining and plate burning divisions are briefly described. Illustrations accompany the text—8 pages. Composite Forgings Inc., 2300 W. Jefferson Ave., Detroit 16, Mich.

Engines

The 115 to 410-hp Le Roi L3000, H2000 and F15000 engines are described. Cutaway views and photographs show advanced features—catalog E-9, 8 pages. Sales Promotion Dept., Le Roi Division, Westinghouse Air Brake Co., 1706 S. 68th St., Milwaukee 14, Wis.

Ribbon Selection

Here is information on the selection of ribbons for typewriters, calculators, tabulators, adding, teletype and addressing machines. The differences in silk, nylon and cotton ribbons are pointed out—6 pages. Remington Rand Inc., 315 Fourth Ave., New York 10, N. Y.

Plastics

More than 35 types and grades of its laminated plastics and molded plastics are detailed. Typical applications using sheet, rods and tubes are covered. Techniques for working plastics are suggested—12 pages. Richardson Co., Lake & 26th Sts., Melrose Park, Ill.

Materials Handling

This folder announces the Flowmation System which has been developed to satisfy the demands of today's automated factories—bulletin FM, 6 pages. Powell Pressed Steel Co., Hubbard, O.

Heating Equipment and Control

This selector guide determines the type and size of heaters for various surface heating applications—GEA-6146, 4 pages. General Electric Co., Schenectady 5, N. Y.

Cowles

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Anhydrous Sodium Orthosilicate

High-powered Cleaning at Low Cost

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DRYORTH is a fast, economical cleaner for

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★ steel pipe — before galvanizing
★ heavy ferrous parts and castings

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*Reg. U. S. Pat. Off.

Cowles also manufactures a complete line of cleaners engineered to handle all kinds of cleaning problems on both ferrous and non-ferrous metals. The Cowles Technical Man in your area will be glad to discuss any metal cleaning problems you have. Write us today!

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7016 Euclid Avenue
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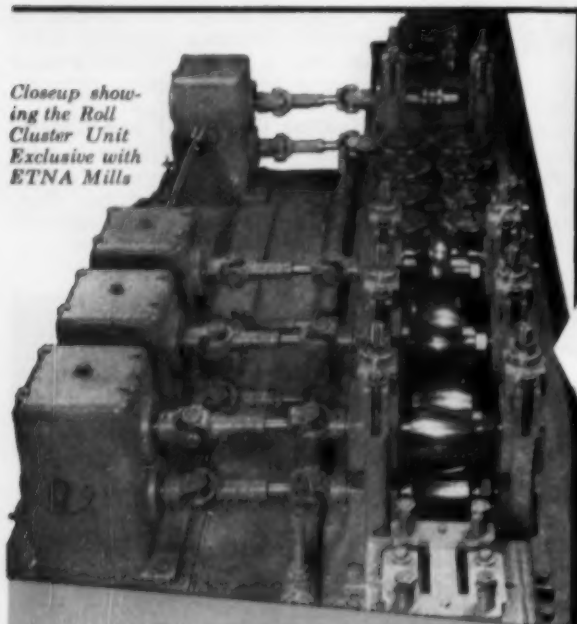
LEADING THE INDUSTRY IN DESIGN...

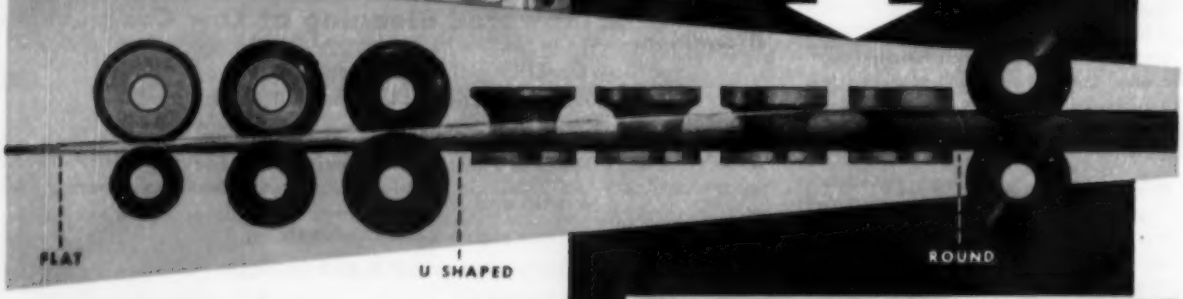


Closeup showing the Roll Cluster Unit Exclusive with ETNA Mills

NO MARKING . . . NO SCRATCHING
NO UPSET EDGES . . .

THE Etna METHOD

FOR SMOOTH, WELL FORMED STEEL TUBING



Exclusive with Etna is the cluster unit. This unit progressively rolls the tube into shape without excessive stretching of the edges, thereby eliminating the "buckling" experienced with ordinary tube mills. Etna machines are not forming mills, they are designed for one purpose only . . . to make clear, well formed carbon and stainless steel tubing with no marking, no scratching, no upset edges. Write for complete details.

The ETNA 4KU Mill

Abbey ETNA Company

3402 MAPLEWOOD AVE., TOLEDO 10, OHIO

Market Outlook

STEEL PRODUCTION is so good that weekly tonnage is only a shade under the record.

A rise of 4.5 points in the national rate would yield a tonnage equal to the record of 2,324,000 net tons made in the week ended Mar. 29, 1953. To match it, the operating rate would have to be 96 per cent of capacity.

All this year the rate has climbed. It rose another point in the week ended Mar. 13 and registered 91.5 per cent.

EASIER—A new record in weekly tonnage could be set in 1955 at a lower percentage of operations than in 1953. The reason: Bigger capacity now. In setting the weekly record of 2,324,000 tons in 1953, the industry had to operate at 103.1 per cent of capacity. Then its weekly capacity was 2,254,459 net tons. Now it is 2,413,278 net tons.

The 91.5 per cent rate in the week ended Mar. 13 yielded 2,208,000 net tons of steel.

SHARP CONTRAST—A year ago, the national steelmaking rate was only 70 per cent of capacity. What's causing steel demand to be so high now? Three things: Good business in the metal consuming industries, completion of inventory reductions and some rebuilding of metal inventories.

Steel consumption was not so low as steel production last year. Consumers were using more steel than they were buying; they were living to a great extent off their inventories.

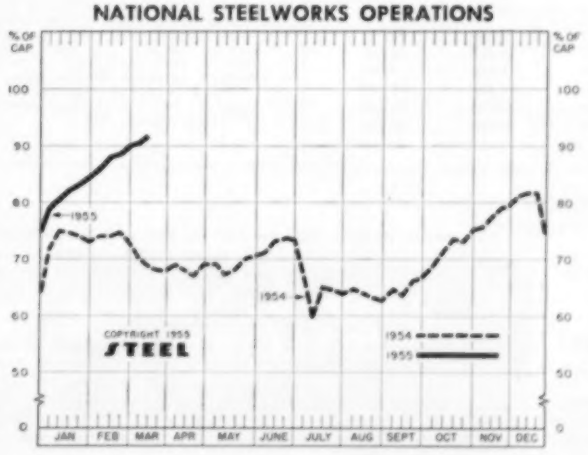
ANALYZING THE BOOM—Many people attribute a lot of the boom in steel demand to the high output of automobiles. Ordinarily, the auto industry takes about 20 per cent of the finished steel made. When the figures become available, they probably will show that the auto industry took close to 25 per cent of the first-quarter's mill shipments of finished steel. You'll also hear that this high rate of auto output feeds other industries. Even so, autos can't take all credit for the boom in demand.

BROAD BASE—Orders are heavy for such products as silicon sheets, used in the electrical industry, and coated sheets, used in a multitude of products. Plates are in increasing demand because of pipe line and railroad requirements.

PUSHUP IN PRICES—Proof of the good demand for steel are a couple of price increases. U. S. Steel Corp. raised its export price on galvanized sheets 15 cents a hundred pounds at New York, Philadelphia and Baltimore. The new price is $5.82 a hundred. Galvanized sheets, particularly those from the continuous hot-dip lines, are in heavy demand. Central Iron & Steel Co., Harrisburg, Pa., raised its prices of carbon steel plate and floor plate up to the general market. Its increases were $5 a ton on carbon plate and $2.50 a ton on floor plate. When the steel market sagged some months ago, Central dropped its prices below the market. Tin plate producers are holding the price line for their six-month pricing period beginning Apr. 1. German steel producers raised their prices on export material.

HOLDING THE LINE—None of the steel price changes alters STEEL's finished steel price composite. It holds at $117.82 a net ton. STEEL's price composite on steelmaking scrap is steady at $37.33 a gross ton.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

(Percentage of capacity engaged)

	Week Ended Mar. 13	Change	Same Week 1954	Same Week 1953
Pittsburgh	91.5	+ 1*	79	107
Chicago	94.5	— 0.5*	75	105
Mid-Atlantic	89	+ 2	65	97
Youngstown	95	+ 3	66	106
Wheeling	92.5	— 3.5	82.5	100.5
Cleveland	97	+ 1.5*	65	102
Buffalo	92.5	— 7.5	63.5	106.5
Birmingham	86.5	0	78.5	98
New England	80	0	60	89
Cincinnati	85	— 0.5	71.5	100.5
St. Louis	96	0	43.5	87
Detroit	88	+ 0.5*	80	107
Western	96	+ 2	74	113
National Rate	91.5	+ 1	68.5	101

INGOT PRODUCTION‡

	Week Ended Mar. 13	Week Ago	Month Ago	Year Ago
INDEX (1947-1949=100)	136.8†	138.1	130.4	102.8
NET TONS (In thousands)	2,198†	2,218	2,095	1,652

*Change from preceding week's revised rate. †Estimated. ‡Amer. Iron & Steel Institute. Weekly capacity (net tons): 2,413,278 in 1955; 2,384,549 in 1954; 2,254,459 in 1953.

Metalworking Outlook—p. 47 Technical Outlook—p. 103

Price Indexes and Composites

FINISHED STEEL PRICE INDEX (Bureau of Labor Statistics)

	Mar. 8 1955	Mar. 1 1955	Month Ago	Feb. Average
(1947-1949=100)	144.7	144.7	144.7	144.7

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Mar. 8

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them write to STEEL.

Rails, Standard, No. 1	$4.525	Sheets, Electrical	$9.350
Rails, Light, 40 lb	5.917	Strip, C.R., Carbon	7.493
Tie Plates	5.275	Strip, C.R., Stainless, 430 (lb)	0.415
Axles, Railway	7.500	Strip, H.R., Carbon	5.113
Wheels, Freight Car, 33 in. (per wheel)	48.500	Pipe, Black, Buttweld (100 ft)	15.000
Plates, Carbon	4.675	Pipe, Galv. Buttweld (100 ft)	18.605
Structural Shapes	4.517	Pipe, Line (100 ft)	146.804
Bars, Tool Steel, Carbon (lb)	0.430	Casing, Oil Well, Carbon (100 ft)	154.216
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.525	Casing, Oil Well, Alloy (100 ft)	227.875
Bars, Tool Steel, H.R., Alloy, High Speed W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.080 (lb)	1.115	Tubes, Boiler (100 ft)	‡
Bars, Tool Steel, H.R., Alloy, High Speed W 18, Cr 4, V 1 (lb)	1.610	Tubing, Mechanical, Carbon	‡
Bars, H.R., Alloy	5.575	Tubing, Mechanical, Stainless, 304 (100 ft)	161.193
Bars, H.R., Stainless, 305 (lb)	0.423	Tin Plate, Hot-dipped, 1.25 lb	9.533
Bars, H.R., Carbon	5.000	Tin Plate, Electrolytic, 0.25 lb	7.233
Bars, Reinforcing	4.963	Black Plate, Canmaking Quality	6.333
Bars, C.F., Carbon	5.160	Wire, Drawn, Carbon	7.938
Bars, C.F., Alloy	11.375	Wire, Drawn, Stainless, 430 (lb)	0.546
Bars, C.F., Stainless, 302 (lb)	0.438	Bale Ties (bundle)	5.860
Sheets, H.R., Carbon	4.870	Nails, Wire, 8d Common	7.815
Sheets, C.R., Carbon	5.864	Wire, Barbed (80-rod spool)	7.097
Sheets, Galvanized	7.220	Woven Wire Fence (20-rod roll)	16.815
Sheets, C.R., Stainless, 302 (lb)	0.553		

‡Not available.

STEEL's FINISHED STEEL PRICE INDEX*

	Mar. 9 1955	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Index (1935-39 avg.=100)	194.53	194.53	194.53	189.74	156.13
Index in cents per lb	5.270	5.270	5.270	5.140	4.230

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT*	$117.82	$117.82	$117.82	$113.73	$93.18
No. 2 Fdry, Pig Iron, GT	56.54	56.04	56.54	56.54	46.47
Basic Pig Iron, GT	56.04	56.04	56.04	56.04	45.97
Malleable Pig Iron, GT	57.27	57.27	57.27	57.27	47.27
Steelmaking Scrap, GT	37.33	37.33	36.33	24.17	27.50

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Mar. 9 1955	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh	4.30	4.30	4.30	4.15	3.45
Bars, H.R., Chicago	4.30	4.30	4.30	4.15	3.45
Bars, H.R., deld. Philadelphia	4.55	4.55	4.55	5.302	3.93
Bars, C.F., Pittsburgh	5.40	5.40	5.40	5.20	4.10-4.15
Shapes, Std., Pittsburgh	4.25	4.25	4.25	4.10	3.40
Shapes, Std., Chicago	4.25	4.25	4.25	4.10	3.40
Shapes, deld. Philadelphia	4.53	4.53	4.53	4.38	3.42
Plates, Pittsburgh	4.225	4.225	4.225	4.10	3.50
Plates, Chicago	4.225	4.225	4.225	4.10	3.50
Plates, Coatesville, Pa.	4.225	4.225	4.225	4.10	3.60
Plates, Sparrows Point, Md.	4.225	4.225	4.225	4.10	3.50
Plates, Claymont, Del.	4.225	4.225	4.225	4.10	3.60
Sheets, H.R., Pittsburgh	4.05	4.05	4.05	3.925	3.35
Sheets, H.R., Chicago	4.05	4.05	4.05	3.925	3.35
Sheets, C.R., Pittsburgh	4.95	4.95	4.95	4.775	4.10
Sheets, C.R., Chicago	4.95	4.95	4.95	4.775	4.10
Sheets, C.R., Detroit	5.10	5.10	5.10	4.975	4.30
Sheets, Galv., Pittsburgh	5.45	5.45	5.45	5.275	4.40
Strip, H.R., Pitts.	4.05	4.05	4.05	4.425	3.25
Strip, H.R., Chicago	4.05	4.05	4.05	3.925	3.25
Strip, C.R., Pittsburgh	5.75	5.75	5.75	5.45	4.15
Strip, C.R., Chicago	5.85	5.85	5.85	5.70	4.30
Strip, C.R., Detroit	5.90	5.90	5.90	5.45-6.05	4.35-.40
Wire, Basic, Pitts.	5.75	5.75	5.75	5.525	4.50
Nails, Wire, Pittsburgh	6.85	6.85	6.85	6.55	5.30
Tin Plate (1.50 lb), box, Pitts.	$9.05	$9.05	$9.05	$8.90	$7.50

SEMIFINISHED STEEL					
Billets, Forging, Pitts. (NT)	$78.00	$78.00	$78.00	$76.50	$63.00
Wire Rods, 5/16-9/32" Pitts.	4.675	4.675	4.675	4.525	3.65

PIG IRON, Gross Ton					
Bessemer, Pitts.	$57.00	$57.00	$57.00	$57.00	$47.00
Basic, Valley	56.00	56.00	56.00	56.00	46.00
Basic, deld. Phila.	59.66	59.66	59.66	59.66	49.44
No. 2 Fdry, Pitts.	56.50	56.50	56.50	56.50	46.50
No. 2 Fdry, Chicago	56.50	56.50	56.50	56.50	46.50
No. 2 Fdry, Valley	56.50	56.50	56.50	56.50	46.50
No. 2 Fdry, deld. Phila.	55.16	55.16	55.16	60.16	49.94
No. 2 Fdry, Birm.	52.88	52.88	52.88	52.88	42.38
No. 2 Fdry (Birm.) deld. Cin.	60.58	60.58	60.58	60.43	49.08
Malleable, Valley	56.50	56.50	56.50	56.50	46.50
Malleable, Chicago	56.50	56.50	56.50	56.50	46.50
Ferromanganese, Duquesne	190.00†	190.00†	190.00†	200.00†	175.00*

*75-82% Mn, gross ton, Etna, Pa. †74-76% Mn, net ton.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pitts.	$38.50	$38.50	$38.00	$25.50	$31.00
No. 1 Heavy Melt, E. Pa.	39.50	39.50	37.00	22.00	23.50
No. 1 Heavy Melt, Chicago	34.00	34.00	34.00	25.00	27.50
No. 1 Heavy Melt, Valley	37.50	37.50	36.50	23.50	31.75
No. 1 Heavy Melt, Cleve.	35.50	34.00	34.00	20.50	28.25
No. 1 Heavy Melt, Buffalo	32.50	32.50	32.50	24.00	28.25
Rails, Rerolling, Chicago	49.50	49.50	49.50	36.50	40.50
No. 1 Cast, Chicago	40.00	40.00	40.00	31.50	41.00

COKE, Net Ton					
Beehive, Furn, Connisvl.	$13.75	$13.75	$13.75	$14.75	$13.25
Beehive, Fdry, Connisvl.	16.75	16.75	16.75	16.75	15.50
Oven Fdry, Chicago	24.50	24.50	24.50	24.50	21.00

Daily Nonferrous Price Record

	Price Mar. 9	Last Change	Previous Price	Feb. Avg.	Jan. Avg.	Mar. 1954 Avg.
Copper	33.00	Jan. 28, 1955	30.00	33.000	30.180	29.665
Lead	14.80	Oct. 4, 1954	14.55	14.800	14.800	12.735
Zinc	11.50	Sept. 3, 1954	11.00	11.500	11.500	9.657
Tin	91.375	Mar. 9, 1955	90.875	90.906	87.280	93.518
Nickel	64.50	Nov. 24, 1954	60.00	64.500	64.500	60.000
Aluminum	23.20	Jan. 12, 1955	23.20	23.200	22.900	21.500
Magnesium	27.00	Mar. 9, 1953	24.50	27.000	27.000	27.000

Quotations in cents per pound based on: COPPER, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary ingots, 99+%, deld.; MAGNESIUM, 99.8%, Freeport, Tex.

What You Can Use the Markets Section for:

- **A source of price information.**
  Current prices are reported each week. Price changes are shown in italics. Price trends are shown in tables of indexes and comparisons.

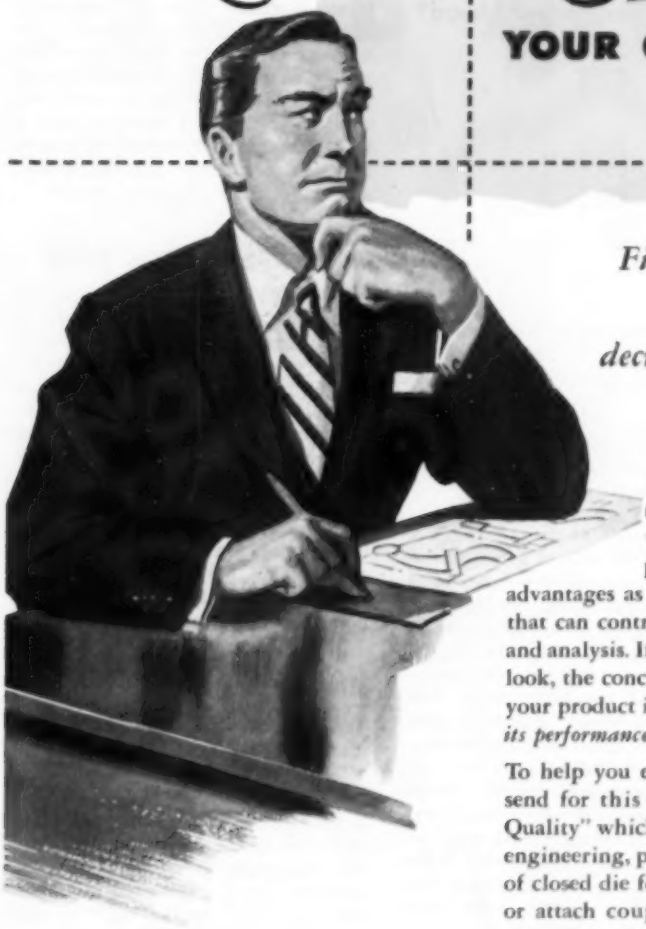
- **A directory of producing points.**
  Want to know who makes something, or where it is made? The steel price tables alphabetically list the cities of production and indicate the producing company. If you are a buyer, you may want to make a map showing comparative distances of sources of supply and to help you compute freight costs. If you are a seller of supplies you can make a map to spot your sales possibilities.

- **A source of price data for making your own comparisons.**
  Maybe you want to keep a continuous record of price spread between various forms of steel. You can get your base price information from STEEL's price tables.

- **A source of information on market trends.**
  Newsy items tell you about the supply-demand situation of materials, including iron and steel, nonferrous metals and scrap. Other articles analyze special situations of interest and importance to you.

- **Reports on iron and steel production, and materials and product shipments.**

ARE THE PARTS IN *Your* PRODUCT YOUR OWN COMPETITION?



Finding better ways to improve your product and decrease its cost can begin with a **FORGING**

● Obviously, such a question is important. It means that you begin to consider the processes as well as the materials that eventually make up your product. Closed die forgings offer basic cost-saving advantages as well as scientific and engineering advancements that can contribute importantly to your successful evaluation and analysis. If it has been some time since you really took a close look, the conclusions may surprise you. Forgings can improve your product in many ways—*its cost*, its quality, *its salability* and *its performance.*

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Nonferrous Metals

Is there an aluminum shortage? Many consumers and smelters deny it. Scare buying, inventory build-up, scrap exports and governmental stockpiling are the key factors

Nonferrous Metal Prices, Pages 140 & 141

IF THERE'S A SHORTAGE of aluminum today, you'd never know it from the level of operations—from smelters to consumers. Few plants have been forced to cut back schedules because of insufficient supplies of the metal.

There has been much talk and speculation about the supply-demand picture in this industry. To get to the bottom of what it means, STEEL went to the grass roots of the industry—those who use and deal in aluminum. Here is what they say:

Stampers: No shortage, but delivery on sheets has been extended about two weeks more than usual.

Casters: No shortage, but they aren't using as much scrap as they'd like to.

Smelters: No shortage, but they can't get as much high-grade scrap as they'd like at reasonable prices.

Warehouses: No shortage, but deliveries are a bit slower, especially on sheet.

Scrap Dealers: No shortage, but the quality of scrap has dropped a little. The price leveled off the last two weeks and should be down within a month or two.

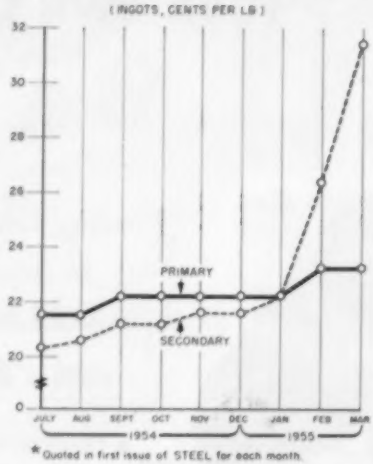
Primary Producers: No shortage, but orders will be screened and filled on a historical basis.

If there is no shortage, then what accounts for the tightness that everybody talks about and the antics of secondary prices? The situation is complex, but in its simplest terms it might be broken down into scare buying, inventory build-up, governmental stockpiling and heavy exports of scrap.

Cause and Effect—As a growth metal, aluminum production has doubled since 1950. Its civilian fabrication has doubled since the Korean war. Inventories were dangerously low last year, so when business picked up in the fourth quarter, users had to increase buying not only for current production but also for their own stockpiles. By the end of 1954, a tightness in the market was feared by many people, who reacted in the normal way and began to buy heavily to insure themselves.

But producers of primary and secondary aluminum were having their own problems in scrap. Exports had

ALUMINUM PRICES:
How Secondary Forged Ahead*



* Quoted in first issue of STEEL for each month.

increased so much—from 9 million lb in 1953 to 72 million lb in 1954—that we were becoming a scrap-poor nation. Foreign prices for the material had pushed domestic prices to levels described as "way too high." As demand and the price of scrap went up, so did secondary prices. The accompanying chart based on the primary ingot price and the average of the highest prices paid for ten grades of secondary ingots, shows the shift in pattern. Even the highest priced secondary metal was beneath the primary price until January. Since then the difference has become greater almost with each passing week. Granted that secondary aluminum can be bought at less than the average shown, the differential is still in the neighborhood of 5 to 7 cents a pound.

Metal at Any Price—Many buyers who were formerly in the secondary market are now scrambling for the cheaper primary, only to find those producers honoring orders "on a historical basis" because of the increased demand. Finding themselves on the outside looking in, the buyers have gone for metal at any price. All of which again puts the pressure on secondary price. In the meantime, the government continues its heavy stockpiling, which many persons say is the cause of the whole "shortage" situation.

In the meantime, aluminum operations continue at a hot pace. Apex Smelting Co. was the only firm interviewed by STEEL which said a shortage was putting a crimp in its operations. One of its plants is not quite up to capacity because of a scrap shortage. One stamper said: "I'm not screaming shortage. I'm having one of the best peacetime years I've ever had. Maybe it's those who are having the second-best year who are yelling. I have to plan a full quarter ahead instead of maybe only half a quarter, but that's normal when business is real good."

Galvanizing Continues Bright

Galvanized sheet steel continues to be one of the brightest spots in the nonferrous as well as the steel industry. Shipments in January—211,101 tons—were the highest since last July and were well above the 169,086 tons of January, 1954. The pace of shipments should continue, which means good business for zinc. The demand for prime western has been at satisfactory levels, and continuous galvanizing is increasing the demand for high grade. There is quite a bit of degrading of special high to supply these lines.

Market Memos

- Aluminum Co. of America has begun production of ½-in. to 8-in. welded tubing on two new mills at its Alcoa, Tenn., plant.
- Shipments of wrought magnesium products and primary ingot production increased in January over December. Ingot production was below the year-ago level, but wrought products increased 82.7 per cent.

STEEL's Metal Price Averages for Feb., 1955
(Cents per pound)

Electrolytic Copper, del. Conn.	33.000
Lead, St. Louis	14.800
Prime Western Zinc, E. St. Louis	11.500
Straits Tin, New York	90.908
Primary Aluminum Ingots, del.	23.200
Magnesium, Freeport, Tex.	27.000
Nickel, f.o.b. refinery	64.500

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SELECT

BRASS SPECIAL

INTERMEDIATE

HIGH GRADE

SPECIAL HIGH GRADE

AMERICAN ZINC SALES COMPANY

Distributors for

AMERICAN ZINC, LEAD & SMELTING COMPANY

Columbus, O. Chicago St. Louis New York

Nonferrous Metals

Cents per pound, carlots, except as otherwise noted

PRIMARY METALS AND ALLOYS

Aluminum: 99 + %, ingots 23.20, pigs 21.50, 10,000 lb or more, f.o.b. shipping point. Freight allowed on 500 lb or more.

Aluminum Alloy: No. 12, 12% Si, 25.00; No. 43, 5% Si, 24.80; No. 142, 4% Cu, 1.5% Mg, 2% Ni, 26.20; No. 195, 4.5% Cu, 0.8% Si, 25.50; No. 214, 3.8% Mg, 26.20; No. 356, 7% Si, 0.3% Mg, 24.90.

Antimony: R.M.M. brand, 99.5%, 28.50, Lone Star brand, 30.00, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 27.00-28.00 New York, duty paid, 10,000 lb or more.

Beryllium: 97%, lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $72.75 per lb of contained Be, f.o.b. Reading, Pa., Elmore, O.

Beryllium Copper: 3.75-4.25% Be, $40 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. Reading, Pa., or Elmore, O.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.70 per lb, deld.

Cobalt: 97-99%, $2.60 per lb for 550-lb keg; $2.62 per lb for 100-lb case; $2.67 per lb under 100 lb.

Columbium: Powder, $118.30 per lb, nom.

Copper: Electrolytic 33.00 deld. Conn. Valley, 33.00 deld. Midwest; Lake 33.00 deld; Fire refined 32.75 deld.

Germanium: 99.9%, $294.84 per lb, nom.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $90-$120 nom. per troy oz.

Lead: Common 14.80, chemical 14.90, corroding 14.90, St. Louis; N. Y. basis, add 0.20.

Lithium: 98%, $10-$14 per lb, depending on quantity.

Magnesium: 99.8%, self-palletizing pig 27.00; notched ingot 27.75, 10,000 lb or more, f.o.b. Freeport, Tex. For Port Newark, N. J., and Madison, Ill., add 1.20 for pig and 1.25 for ingot. Sticks 1.3 in. diameter, 46.00, 100 to 4999 lb, f.o.b. Madison, Ill.

Magnesium Alloys: AZ91C and alloys C, H, G and R 32.50; alloy M 34.50, 10,000 lb or more, f.o.b. Freeport, Tex., or Madison, Ill. Add 1.20 for Port Newark, N. J.

Mercury: Open market, spot, New York, $322-$324, per 76-lb flask.

Molybdenum: Powder 99% hydrogen reduced $3-$3.25 per lb; pressed ingot $4.06 per lb; sintered ingot $5.53 per lb.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked 64.60; 10-lb pigs, unpacked 67.65; "XX" nickel shot 69.00; "F" nickel shot or ingots for addition to cast iron, 64.50; prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 0.92.

Osmium: $120-$130, nom., per troy oz.

Palladium: $17-$20 per troy oz.

Platinum: $76-$80 per troy oz from refineries.

Radium: $16-$21.50 per mg radium content, depending on quantity.

Rhodium: $118-$126 per troy oz.

Ruthenium: $45-$56 per troy oz.

Selenium: 99.5%, $6-$7.25 per lb.

Silver: Open market, 85.25 per troy oz.

Sodium: 16.50, c.l.; 17.00 l.c.l.

Tantalum: Sheet, rod $68.70 per lb; powder $40.20 per lb.

Tellurium: $1.75 per lb.

Thallium: $12.50 per lb.

Tin: Straits, N. Y., spot 91.375, prompt 91.125.

Titanium: Sponge, 99.3+ %, grade A-1 ductile (0.3% Fe max) $4.50, grade A-2 (0.5% Fe max) $4 per pound.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots $4.38-$4.40 per lb, nom., f.o.b. shipping point; less than 1000 lb add 15.00; 99+ % hydrogen reduced, $4.65. Treated ingots $6.70.

Zinc: Prime Western 11.50, brass special 11.75, intermediate 13.00, E. St. Louis, freight allowed over 0.50 per pound. High grade 12.85, special high grade 13.00, die casting alloy ingot 15.50, deld.

Zirconium: Sponge $10 per lb; powder sinctronics grade $15, flash grade $11.50. (Note: Chromium, manganese and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloy 29.00-31.75; No. 13 foundry alloy (No. 2 grade) 28.50-30.50; 5% silicon alloy, 0.60 Cu max, 30.25-32.25; 13 alloy, 0.60 Cu max, 30.25-32.25, 195 alloy 29.75-33.00; 108 alloy 29.00-31.00; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 30.50-32.50; grade 2, 29.50-31.50; grade 3, 28.50-30.50; grade 4, 27.50-29.50.

Brass Ingot: Red brass No. 115, 34.00; tin bronze No. 225, 45.50; No. 245, 39.25; high-leaded tin bronze No. 305, 38.00; No. 1 yellow, No. 405, 29.75; manganese bronze No. 421, 32.25.

Magnesium Alloy Ingot: AZ63A, 31.00; AZ91B, 34.00; AZ91C, 31.00; AZ92A, 31.00.

NONFERROUS MILL PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb, f.o.b. Temple, Pa.; nominal 1.9% Be alloy) Strip, $1.71; rod, bar, wire, $1.69.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 100,000-lb lots, 38.35; 30,000-lb lots, 38.48; l.c.l. 38.98. Weatherproof, 100,000 lb, 38.53; 30,000 lb, 38.75; l.c.l. 39.28. Magnet wire deld., 15,000 lb or more 44.99; l.c.l. 45.74.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets, full rolls, 140 sq ft or more $20 per cwt; pipe, full coils $20 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill) Sheets, $15; sheared mill plate, $12; strip, $15; wire, $10; forging billets, $9; hot-rolled and forged bars, $9.

ZINC

(Prices per lb, c.l., f.o.b. mill) Sheets 23.00, ribbon zinc in coils, 19.00-20.50; plates 18.00-22.25.

ZIRCONIUM

Plate $27; H.R. strip $28; C.R. strip $35; forged or H.R. bars $27; wire, 0.015 in., 1.00c per linear foot.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheet, C.R.	102	78	99
Strip, C.R.	102	87	125
Plate, H.R.	97	82	95
Rod, Shapes H.R.	87	69	93
Rod, Shapes C.R.	91	75	115
Seamless Tubes	122	105	153
Shot, Blocks		65	

ALUMINUM

Screw Machine Stock: 5000 lb and over.

Diam. (in.) or across flats	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
Drawn				
0.125	63.5	62.0	...	...
0.156-0.172	53.9	53.3	...	...
0.188	53.9	53.3	...	66.8
0.219-0.234	51.1	49.5	...	...
0.250-0.281	51.1	49.5	...	63.7
0.313	51.1	49.5	...	60.8
Cold-finished				
0.375-0.547	49.9	47.5	59.8	57.2
0.563-0.688	49.9	47.5	54.9	53.7
0.750-1.000	48.7	46.3	52.1	50.6
1.063	48.7	46.3	...	48.9
1.125-1.500	46.9	44.6	50.4	48.9
Rolled				
1.563	45.7	43.4	...	...
1.625-2.000	45.1	42.8	...	47.2
2.125-2.500	44.0	41.7	...	...
2.563-3.375	42.7	40.5	...	...

ALUMINUM

Sheets and Circles: 1100 and 3003 mill finish (30,000 lb base; freight allowed over 499 lb)

Thickness Range Inches	Flat Sheet	Flat Sheet Circles*	Coiled Sheet	Coiled Sheet Circles†
0.249-0.136	35.9	40.4	...	...
0.135-0.096	36.4	41.3	...	...
0.095-0.077	37.1	42.3	34.6	39.6
0.076-0.061	37.7	43.2	34.8	39.8
0.060-0.048	38.2	43.6	35.1	40.2
0.047-0.038	38.7	44.5	35.6	40.6
0.037-0.030	39.1	45.0	36.0	41.3
0.029-0.024	39.7	45.5	36.3	41.8
0.023-0.019	40.4	46.9	37.1	42.6
0.018-0.017	41.2	...	37.7	43.5
0.016-0.015	42.1	...	38.5	44.7
0.014	43.1	...	39.5	46.0
0.013-0.012	44.3	...	40.2	47.0
0.011	45.3	...	41.4	48.6
0.010-0.0095	46.5	...	42.5	50.2
0.009-0.0085	47.8	...	44.0	52.3
0.008-0.0075	49.4	...	45.2	54.1
0.007	50.9	...	46.7	56.4
0.006	52.5	...	48.1	61.4

*48 in. max diam. †26 in. max diam.

ALUMINUM

Plates and Circles: Thickness 0.250-3 in. 24-60 in. width or diam, 72-240 in. lengths.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	34.6	38.8
5050-F	35.7	39.9
3004-F	36.7	41.6
5052-F	38.4	43.4
6061-T6	39.6	44.0
2024-T4*	41.8	47.9
7075-T6*	49.6	56.2

*24-48 in. widths or diam, 72-180 in. lengths.

ALUMINUM

Forging Stock: Round, Class 1, 47.80-37.30, in specific lengths 36-144 in., diameters 0.375-8 in. Rectangles and squares, Class 1, 53.60-41.00 in random lengths, 0.375-4 in. thick, widths 0.750-10 in.

Pipe: A.S.A. Schedule 40, alloy 6063-T6, 20-ft length, plain ends, 90,000-lb base, per 100 ft.

Nom. Pipe Size (in.)		Nom. Pipe Size (in.)	
⅜	$16.10	2	$ 49.55
1	25.35	4	136.65
1¼	34.30	6	244.90
1½	41.00	8	368.50

MAGNESIUM

Sheet: AZ31, commercial grade, 0.032-in. 94.00, 0.064-in. 73.00, 0.125-in. 60.00, 30,000 lb and over, f.o.b. mill.

Plate: Hot-rolled AZ31, 53.00, 20,000 lb or more, 0.250-in. and over widths to 48 in., lengths to 144 in.; raised pattern floor plate, 59.00, 20,000 lb or more, ¼-in. thick, widths 24-72 in., lengths 60-192 in.

Extrusion Stock: AZ31, Rectangles, ¼ x 2 in. 69.20, 1 x 4 in. 63.00. Rod, 1 in. 66.00, 2 in. 62.50. Tubing, 1 in. OD x 0.065-in. 87.00. Angles, 1 x 1 x ⅛-in. 72.90, 2 x 2 x ¼-in. 67.00. Channels, 5 in. 67.80. I-Beams, 5 in. 66.20.

NONFERROUS SCRAP

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots)

Aluminum: 1100 clippings 18.00-18.50; old sheet 15.50-16.00; borings and turnings 9.50-10.00; crankcases 15.50-16.00; industrial castings 15.50-16.00.

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES f		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tube	Clean Heavy	Rod Ends	Clean Turnings
Copper	51.76b	49.36	....	51.82	29.000	29.000	28.250
Yellow Brass	44.27	44.21	44.81	47.18	21.875	21.625	20.125
Red Brass, 85%	48.44	48.36	48.96	51.25	25.500	25.250	24.750
Low Brass, 80%	47.35	47.29	47.89	50.16	24.625	24.375	23.875
Naval Brass	48.18	42.49	88.24	51.34	20.250	20.000	19.500
Com. Bronze, 90%	50.08	50.02	50.62	52.64	26.625	26.375	25.875
Nickel Silver, 10%	58.25	62.25	60.58	....	26.000	25.750	13.000
Phos. Bronze, A, 5%	70.12	70.62	70.62	71.80	29.375	29.125	28.125
Silicon Bronze	55.94	55.13	55.98	57.86c	28.000	27.750	27.000
Manganese Bronze	51.92	46.02	56.46	....	20.375	20.125	19.500
Muntz Metal	46.34	42.15	....	....	20.625	20.375	19.875

a. Cents per lb, f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. 3% silicon. f. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb. g. Leaded.

Copper and Brass: Heavy copper and wire No. 1 30.00-30.50; No. 2 copper 29.00-29.50; light copper 26.50-27.50; No. 1 composition red brass 24.00-24.50; No. 1 composition turnings 23.00-24.00; yellow brass turnings 16.00-16.50; new brass clippings 20.50-22.00; No. 1 brass rod turnings 17.50-19.00; light brass 14.50-15.00; heavy yellow brass 16.00-18.50; new brass rod ends 18.50-20.00; auto radiators, unsweated 18.50-19.50; cocks and faucets 19.50-20.50; brass pipe 19.50-20.50.

Lead: Heavy 11.50-11.75; battery plate 6.00-6.75; linotype and stereotype 13.50-14.50; electrotype 12.00-12.50; mixed babbitt 12.00-14.00.

Magnesium: Clippings 18.50-19.50; clean castings 17.50-18.50; iron castings, not over 10% removable Fe, 15.50-16.50.

Monel: Clippings 28.00-35.00; old sheet 26.00-33.00; turnings 21.00; rods 28.00-35.00.

Nickel: Sheets and clips 55.00-60.00; rolled anodes 57.00-65.00; turnings 40.00-45.00; rod ends 57.00-65.00.

Tin: No. 1 pewter 50.00-55.00; block tin pipe 70.00-75.00; No. 1 babbitt 45.00-48.00.

Zinc: Old zinc 4.75-5.50; new die cast scrap 4.75-5.00; old die cast scrap 3.25-3.50.

REFINERS' BUYING PRICES
(Cents per pound, carlots, delivered refinery)

Aluminum: 1100 clippings 21.00-23.00; 3003 clippings 21.00-22.50; 6151 clippings 21.00-22.50; 5052 clippings 21.00-23.00; 2014 clippings 20.00-22.00; 2017 clippings 20.00-22.00; 2024 clippings 20.00-22.00; mixed clippings 20.00-21.00; old sheet 18.50-20.00; old cast 18.50-20.00; clean old cable (free of steel) 21.00-22.00; borings and turnings 18.50-20.50.

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 45.00; light scrap 40.00.

Copper, Brass: No. 1 copper 33.50; No. 2 copper 32.00; light copper 30.25-30.50; refinery brass (60% copper) per dry copper content 28.00-28.50.

INGOTMAKERS' BUYING PRICES
(Cents per pound, carlots, delivered)

Copper, Brass: No. 1 copper 32.50-33.50; No. 2 copper 31.00-32.00; light copper 29.00-30.25; No. 1 composition borings 27.00-27.25; No. 1 composition solids 27.50; heavy yellow brass solids 21.50; yellow brass turnings 20.50; radiators 22.00-22.25.

PLATING MATERIALS

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes $1.70 per lb.

Copper: Flat-rolled 48.42, oval 47.92, 5000-10,000 lb; electrodeposited 42.78, cast 45.04, 2000-5000-lb lots.

Nickel: Depolarized, less than 100 lb $1.015; 100-499 lb 99.50; 500-4999 lb 95.50; 5000-29,999 lb 93.50; 30,000 lb 91.50. Carbonized, deduct 3 cents a lb. All prices eastern delivery effective Jan. 1, 1955.

Tin: Bar or slab, less than 200 lb $1.095; 200-499 lb $1.08; 500-999 lb $1.075; 1000 lb or more $1.07.

Zinc: Bar 20.00, bar or flat top 19.00, ton lots.

CHEMICALS

Cadmium Oxide: $2.15 per lb, in 100-lb drums.

Chromic Acid: Less than 10,000 lb 28.50; over 10,000 lb 27.50.

Copper Cyanide: 100 lb 71.80; 200 lb 71.05; 300 lb 70.80; 400-900 lb 70.05; 1000 lb and over 68.05, effective Feb. 11, 1955.

Copper Sulphate: Crystal, 100 lb 20.50; 200 lb 17.50; 300 lb 16.50; 400 lb 16.00; 500-1900 lb 14.50; 2000 to 10,000 lb 14.25; 10,000 lb and up 14.15. Powder, add 0.5 to above prices. Effective Jan. 31, 1955.

Nickel Chloride: 100 lb 46.50; 200 lb 44.50; 300 lb 43.50; 400-4900 lb 41.50; 5000-9900 lb 39.50; 10,000 lb and over 38.50. All prices eastern delivery, effective Jan. 1, 1955.

Nickel Sulphate: 100 lb 38.25; 200 lb 36.25; 300 lb 35.25; 400-4900 lb 33.25; 5000-25,900 lb 31.25; 26,000 lb 30.25. All prices eastern delivery, effective Jan. 1, 1955.

Silver Cyanide: Cents per ounce, 16 oz 80.625; 100 oz 78.50; 25,000 oz and over 77.325.

Sodium Cyanide: Egg, under 1000 lb 19.80; 1000-19,900 lb 18.80; 20,000 lb and over 17.80; granular, add 1-cent premium to above.

Sodium Stannate: Less than 100 lb 70.10; 100-600 lb 55.90; 700-1900 lb 53.40; 2000-9900 lb 51.70; 10,000 lb or more 50.60.

Stannous Chloride (Anhydrous): Less than 50 lb $1.558; 50 lb $1.215, 100-300 lb $1.068, 400-900 lb $1.043; 1000-1900 lb $1.019; 2000-4900 lb 98.20; 5000-19,900 lb 92.10, 20,000 lb and over 86.00.

Stannous Sulphate: Less than 5 lb $1.258; 50 lb 95.80; 100-1900 lb 93.80; 2000 lb and over 91.80.

Zinc Cyanide: Under 1000 lb 54.30; 1000 lb and over 52.20.

another NORGREN 1st in better bearing lubrication at lower cost

Automatic, centralized Micro-Fog Lubro-Control Unit lubricates up to *1000 BEARING INCHES*

Lubricates 350 bearings, 170 gears on CROSS TRANSFER-MATIC Machine in large automobile plant

The 80 ft. long Cross Transfer-Matic shown above is in the engine plant of a large automobile manufacturer. It is completely automatic, and includes an ingenious system of monitoring controls which automatically stops the machine if trouble occurs and flashes signals on a control panel showing location of trouble. It has been machining 80 V-8 engine blocks per hour on a 16-hour-day schedule for more than six months.

The new Norgren Micro-Fog Lubro-Control Unit was selected by The Cross Company for efficient, *automatic* lubrication. Two large capacity Lubro-Control Units (Model 33AB-4) lubricate 350 ball bearings and 170 spur gears in the multiple spindle heads. They operate at approximately 15 psi, use approximately 10 cfm of air, *and use only 1.6 fluid oz. of oil per hour.*

The Norgren Micro-Fog Lubro-Controls have proven advantages on many Cross Transfer and Dial type machines: completely automatic with trouble-alarm system; elimination of bearing and gear box seals, elimination of many smaller lubricators and complex piping systems; better lubrication has resulted in more efficient machine performance, reduced maintenance and lubrication cost; air-borne Micro-Fog lubrication results in lower bearing temperatures . . . bearings operate at temperature only slightly above ambient.

For complete details write for Norgren Blueprint MF-11 and Form 492A

Let Norgren experience help you on your bearing lubrication problems.

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Oil Fog Lubricators • Pressure Regulators
Air Filters • Valves • Hose Assemblies

New Model 33AB-4 Norgren Micro-Fog Lubro-Control Unit used on above Cross Transfer-Matic

Steel Prices

Mill prices as reported to STEEL., cents per pound except as otherwise noted. Changes shown in italics. Code numbers following mill points indicate producing company. Key on page 143. Key to footnotes, page 145.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)

Munhall,Pa. U5	$61.50

INGOTS, Alloy (NT)

Detroit R7	$65.00
Houston S5	70.00
Midland,Pa. C18	65.00
Munhall,Pa. U5	65.00

BILLETS, BLOOMS & SLABS Carbon, Rerolling (NT)

Aliquippa,Pa. J5	$64.00
Bessemer,Pa. U5	64.00
Bridgeport,Conn. N19	69.00
Buffalo R3	64.00
Clairton,Pa. U5	64.00
Ensley,Ala. T2	64.00
Fairfield,Ala. T2	64.00
Fontana,Calif. K1	72.00
Gary,Ind. U5	64.00
Johnstown,Pa. B2	64.00
Lackawanna,N.Y. B2	64.00
Munhall,Pa. U5	64.00
Pittsburgh J5	64.00
So.Chicago,Ill. R2, U5	64.00
So.Duquesne,Pa. U5	64.00
Youngstown R2	64.00

Carbon, Forging (NT)

Aliquippa,Pa. J5	$78.00
Bessemer,Pa. U5	78.00
Bridgeport,Conn. N19	83.00
Buffalo R2	78.00
Canton,O. R2	80.00
Clairton,Pa U5	78.00
Conshohocken,Pa. A3	83.00
Ensley,Ala. T2	78.00
Fairfield,Ala. T2	78.00
Fontana,Calif. K1	86.00
Gary,Ind. U5	78.00
Geneva,Utah C11	78.00
Houston S5	83.00
Johnstown,Pa. B2	78.00
Lackawanna,N.Y. B2	78.00
LosAngeles B3	87.50
Midland,Pa. C18	78.00
Munhall,Pa. U5	78.00
Pittsburgh J5	78.00
Seattle B3	91.50
So.Chicago R2,U5,W14	78.00
So.Duquesne,Pa. U5	78.00
So.SanFrancisco B3	87.50

Alloy, Forging (NT)

Bethlehem,Pa. B2	$86.00
Buffalo R2	86.00
Canton,O. R2, T7	86.00
Conshohocken,Pa. A3	93.00
Detroit R7	86.00
Fontana,Calif. K1	105.00
Gary,Ind. U5	86.00
Houston S5	91.00
Ind.Harbor,Ind. Y1	86.00
Johnstown,Pa. B2	86.00
Lackawanna,N.Y. B2	86.00
LosAngeles B3	106.00
Massillon,O. R2	86.00
Midland,Pa. C18	86.00
Munhall,Pa. U5	86.00
So.Chicago, R2,U5,W14	86.00
So.Duquesne,Pa. U5	86.00
Struthers,O. Y1	86.00
Warren,O. C17	86.00

ROUNDS, SEAMLESS TUBE (NT)

Buffalo R3	$96.50
Canton,O. R2	96.50
Cleveland R3	96.50
Gary,Ind. U5	96.50
So.Chicago R2, W14	96.50
So.Duquesne,Pa. U5	96.50

SKELP

Aliquippa,Pa. J5	4.00
Fontana,Calif. K1	4.775
Munhall,Pa. U5	3.90
SparrowsPoint,Md. B2	3.90
Warren,O. R2	3.90
Youngstown R2, U5	3.90

WIRE RODS

AlabamaCity,Ala. R2	4.675
Aliquippa,Pa. J5	4.675
Alton,Ill. L1	4.85
Buffalo B11, W12	4.675
Cleveland A7	4.675
Donora,Pa. A7	4.675
Fairfield,Ala. T2	4.675
Fontana,Calif. K1	5.475
Houston S5	4.925
IndianaHarbor,Ind. Y1	4.675
Johnstown,Pa. B2	4.675
Joliet,Ill. A7	4.675
KansasCity,Mo. S5	4.925
Kokomo,Ind. C16	4.775
LosAngeles B3	5.475
Minnequa,Colo. C10	4.925
Monessen,Pa. P7	4.675
No.Tonawanda,N.Y. B11	4.675
Pittsburg,Calif. C11	5.325
Portsmouth P12	4.675
Roebling,N.J. R5	4.775
So.Chicago,Ill. R2	4.675
SparrowsPoint,Md. B2	4.775
Sterling,Ill.(1) N15	4.675
Sterling,Ill. N15	4.775
Struthers,O. Y1	4.675
Torrance,Calif. C11	5.475
Worcester,Mass. A7	4.975

STRUCTURALS

Carbon Steel Stand. Shapes

Ala.City,Ala. R2	4.25
Aliquippa,Pa. J5	4.25
Bessemer,Ala. T2	4.25
Bethlehem,Pa. B2	4.30
Birmingham C15	4.25
Clairton,Pa. U5	4.25
Fairfield,Ala. T2	4.25
Fontana,Calif. K1	4.90
Gary,Ind. U5	4.25
Geneva,Utah C11	4.25
Houston S5	4.30
Ind.Harbor,Ind. I-2	4.25
Johnstown,Pa. B2	4.30
KansasCity,Mo. S5	4.30
Lackawanna,N.Y. B2	4.30
LosAngeles B3	4.95
Minnequa,Colo. C10	4.70
Munhall,Pa. U5	4.25
Niles,Calif. P1	4.90
Phoenixville,Pa. P4	3.95
Portland,Oreg. O4	5.00
Seattle B3	5.00
So.Chicago U5, W14	4.25
So.SanFrancisco B3	4.90
Torrance,Calif. C11	4.95
Weirton,W.Va. W6	4.25

Wide Flange

Bethlehem,Pa. B2	4.30
Clairton,Pa. U5	4.25
Fontana,Calif. K1	5.25
Lackawanna,N.Y. B2	4.30
Munhall,Pa. U5	4.25
Phoenixville,Pa. P4	4.30
So.Chicago,Ill. U5	4.25

Alloy Stand. Shapes

Clairton,Pa. U5	5.20
Fontana,Calif. K1	6.60
Gary,Ind. U5	5.20
Houston S5	5.25
Munhall,Pa. U5	5.20
So.Chicago,Ill. U5	5.20

H.S., L.A. Stand. Shapes

Aliquippa,Pa. J5	6.40
Bessemer,Ala. T2	6.40
Bethlehem,Pa. B2	6.45
Clairton,Pa. U5	6.40
Fairfield,Ala. T2	6.40
Fontana,Calif. K1	7.05
Gary,Ind. U5	6.40
Geneva,Utah C11	6.40
Houston S5	6.45
Ind.Harbor,Ind. I-2, Y1	6.40
Johnstown,Pa. B2	6.45
KansasCity,Mo. S5	6.45
Lackawanna,N.Y. B2	6.45
LosAngeles B3	7.10
Munhall,Pa. U5	6.40
Seattle B3	7.15
So.Chicago,Ill. U5, W14	6.40
So.SanFrancisco B3	7.05
Struthers,O. Y1	6.40

H.S., L.A. Wide Flange

Bethlehem,Pa. B2	6.45
Lackawanna,N.Y. B2	6.45
Munhall,Pa. U5	6.40
So.Chicago,Ill. U5	6.40

PILING

BEARING PILES

Munhall,Pa. U5	4.25
So.Chicago,Ill. U5	4.25

STEEL SHEET PILING

Ind.Harbor,Ind. I-2	5.075
Lackawanna,N.Y. B2	5.075
Munhall,Pa. U5	5.075
So.Chicago,Ill. U5	5.075

PLATES

PLATES, Carbon Steel

Ala.City,Ala. R2	4.225
Aliquippa,Pa. J5	4.225
Ashland,Ky.(15) A10	4.225
Bessemer,Ala. T2	4.225
Bridgeport,Conn. N19	4.475
Buffalo R2	4.225
Clairton,Pa. U5	4.225
Claymont,Del. C22	4.225
Cleveland J5, R2	4.225
Coatesville,Pa. L7	4.225
Conshohocken,Pa. A3	4.225
Ecorse,Mich. G5	4.325
Fairfield,Ala. T2	4.225
Fontana,Calif.(30) K1	4.875
Gary,Ind. U5	4.225
Geneva,Utah C11	4.225
GraniteCity,Ill.G4	4.425
Harrisburg,Pa. C5	3.975
Houston S5	4.275
Ind.Harbor,Ind. I-2, Y1	4.225
Johnstown,Pa. B2	4.225
Lackawanna,N.Y. B2	4.225
LoneStar,Tex. L6	4.55
Mansfield,O. E6	4.225
Minnequa,Colo. C10	5.075
Munhall,Pa. U5	4.225
Newport,Ky. N9	4.225
Pittsburgh J5	4.225
Riverdale,Ill. A1	4.225
Seattle B3	5.125
Sharon,Pa. S3	4.225
So.Chicago R2, U5, W14	4.225
SparrowsPoint,Md. B2	4.225
Steubenville,O. W10	4.225
Warren,O. R2	4.225
Weirton,W.Va. W6	4.225
Youngstown R2,U5,Y1	4.225

PLATES, Carbon Abras. Resist.

Fontana,Calif. K1	6.025
Geneva,Utah C11	5.375

PLATES, Wrought Iron

Economy,Pa. B14	9.80

PLATES, High-Strength Low-Alloy

Aliquippa,Pa. J5	6.45
Bessemer,Ala. T2	6.45
Clairton,Pa. U5	6.45
Cleveland J5, R2	6.45
Coatesville,Pa. L7	6.45
Conshohocken,Pa. A3	6.45
Ecorse,Mich. G5	6.55
Fairfield,Ala. T2	6.45
Fontana,Calif.(30) K1	7.15
Gary,Ind. U5	6.45
Geneva,Utah C11	6.45
Houston S5	6.50
Ind.Harbor,Ind. I-2, Y1	6.45
Johnstown,Pa. B2	6.45
Lackawanna,N.Y. B2	6.45
LosAngeles B3	7.35
Munhall,Pa. U5	6.45
Pittsburgh J5	6.45
Seattle B3	7.35
Sharon,Pa. S3	6.45
So.Chicago,Ill. U5, W14	6.45
SparrowsPoint,Md. B2	6.45
Youngstown U5, Y1	6.45

PLATES, Alloy

Claymont,Del. C22	5.80
Coatesville,Pa. L7	5.80
Fontana,Calif. K1	6.45
Gary,Ind. U5	5.80
Houston S5	5.85
Ind.Harbor,Ind. Y1	5.80
Johnstown,Pa. B2	5.80
Munhall,Pa. U5	5.80
Newport,Ky. N9	5.80
Seattle B3	6.70
Sharon,Pa. S3	5.80
So.Chicago,Ill. U5, W14	5.80
SparrowsPoint,Md. B2	5.80
Youngstown Y1	5.80

FLOOR PLATES

Cleveland J5	5.275
Conshohocken,Pa. A3	5.275
Harrisburg,Pa. C5	5.15
Ind.Harbor,Ind. I-2	5.275
Munhall,Pa. U5	5.275
So.Chicago,Ill. U5	5.275

PLATES, Ingot Iron

Ashland c.l. (15) A10	4.675
Ashland l.c.l (15) A10	4.975
Cleveland c.l. R2	4.825
Warren,O. c.l. R2	4.825

BARS

BAR, Hot-Rolled Carbon

Ala.City,Ala. R2	4.30
Aliquippa,Pa. J5	4.30
Alton,Ill. L1	4.50
Atlanta A11	4.50
Bessemer,Ala. T2	4.30
Birmingham C15	4.30
Bridgeport,Conn. N19	4.55
Buffalo R2	4.30
Canton,O. R2	4.40
Clairton,Pa. U5	4.30
Cleveland R2	4.30
Ecorse,Mich. G5	4.40
Emeryville,Calif. J7	5.05
Fairfield,Ala. T2	4.30
FairlessHills,Pa. U5	4.45
Fontana,Calif. K1	5.00
Gary,Ind. U5	4.30
Houston S5	4.55
Ind.Harbor,Ind. I-2, Y1	4.30
Johnstown,Pa. B2	4.30
KansasCity,Mo. S5	4.55
Lackawanna,N.Y. B2	4.30
LosAngeles B3	5.00
Massillon,O. R2	4.40
Midland,Pa. C18	4.30
Milton,Pa. M18	4.30
Minnequa,Colo. C10	4.75
Niles,Calif. P1	5.00
N.Tonawanda,N.Y. B11	4.30
Pittsburg,Calif. C11	5.00
Pittsburgh J5	4.30
Portland,Oreg. O4	5.05
Seattle B3, N14, P23	5.05
So.Chicago, R2,U5,W14	4.30
So.Duquesne,Pa. U5	4.30
So.SanFran.,Calif. B3	5.05
Sterling,Ill.(1) N15	4.30
Sterling,Ill. N15	4.40
Struthers,O. Y1	4.30
Torrance,Calif. C11	5.00
Warren,O. R2	4.30
Weirton,W.Va. W6	4.30
Youngstown R2, U5	4.30

BARS, Hot-Rolled Alloy

Bethlehem,Pa. B2	5.075
Bridgeport,Conn. N19	5.225
Buffalo R2	5.075
Canton,O. R2, T7	5.075
Clairton,Pa. U5	5.075
Detroit R7	5.075
Ecorse,Mich. G5	5.175
Fontana,Calif. K1	6.125
FairlessHills,Pa. U5	5.225
Gary,Ind. U5	5.075
Houston S5	5.325
Ind.Harbor,Ind. I-2, Y1	5.075
Johnstown,Pa. B2	5.075
KansasCity,Mo. S5	5.325
Lackawanna,N.Y. B2	5.075
LosAngeles B3	6.125
Massillon,O. R2	5.075
Midland,Pa. C18	5.075
So.Chicago R2, U5,W14	5.075
So.Duquesne,Pa. U5	5.075
Struthers,O. Y1	5.075
Warren,O. C17	5.075
Youngstown U5	5.075

BARS, H.R. Loaded Alloy

Warren,O. C17	5.825

BARS & SMALL SHAPES, H.R. High-Strength Low-Alloy

Aliquippa,Pa. J5	6.45
Bessemer,Ala. T2	6.45
Bethlehem,Pa. B2	6.45
Clairton,Pa. U5	6.45
Cleveland R2	6.45
Ecorse,Mich. G5	6.55
Fairfield,Ala. T2	6.45
Fontana,Calif. K1	7.70
Gary,Ind. U5	6.45
Houston S5	6.70
Ind.Harb.,Ind. I-2, Y1	6.45
Johnstown,Pa. B2	6.45
KansasCity,Mo. S5	6.70
Lackawanna,N.Y. B2	6.45
LosAngeles B3	7.15
Pittsburgh J5	6.45
Seattle B3	7.20
So.Chicago W14	6.45
So.Duquesne,Pa. U5	6.45
So.SanFrancisco B3	7.20
Struthers,O. Y1	6.45
Warren,O. R2	6.45
Youngstown U5	6.45

BAR SIZE ANGLES; H.R. Carbon

Bethlehem,Pa. B2	4.45

BAR SIZE ANGLES; S. Shapes

Aliquippa,Pa. J5	4.30
Atlanta A11	4.50
Fontana,Calif. K1	5.00
Niles,Calif. P1	5.00
Pittsburgh J5	4.30
Portland,Oreg. O4	5.05
SanFrancisco S7	4.70

BAR SHAPES, Hot-Rolled Alloy

Clairton,Pa. U5	5.20
Gary,Ind. U5	5.20
Houston S5	5.45
KansasCity,Mo. S5	5.45
Youngstown U5	5.20

BARS, Cold-Finished Carbon

Ambridge,Pa. W18	5.40
BeaverFalls,Pa. M12,R2	5.40
Buffalo B5	5.45
Camden,N.J. P13	5.85
Carnegie,Pa. C12	5.40
Chicago W18	5.40
Cleveland A7, C20	5.40
Detroit R7	5.40
Detroit B5, P17	5.60
Donora,Pa. A7	5.40
Elyria,O. W8	5.40
FranklinPark,Ill. N5	5.40
Gary,Ind. R2	5.40
GreenBay,Wis. F7	5.40
Hammond,Ind. L2, M13	5.40
Hartford,Conn. R2	5.90
Harvey,Ill. B5	5.40
LosAngeles R2, S30	6.85
Mansfield,Mass. B5	5.95
Massillon,O. R2, R8	5.40
Midland,Pa. C18	5.40
Monaca,Pa. S17	5.40
Newark,N.J. W18	5.85
NewCastle,Pa.(17) B4	5.40
Pittsburgh J5	5.40
Plymouth,Mich. P5	5.65
Putnam,Conn. W18	5.95
Readville,Mass. C14	5.95
So.Chicago,Ill. W14	5.40
SpringCity,Pa. K3	5.85
Struthers,O. Y1	5.40
Waukegan,Ill. A7	5.40
Worcester,Mass. W19	5.85
Youngstown F3, Y1	5.40

BARS, Cold-Finished Carbon (Turned and Ground)

Cumberland,Md.(5) C19	4.65

BARS, Cold-Finished Alloy

Ambridge,Pa. W18	6.625
BeaverFalls,Pa. M12,R2	6.625
Bethlehem,Pa. B2	6.625
Buffalo B5	6.625
Camden,N.J. P13	6.80
Canton,O. T7	6.625
Carnegie,Pa. C12	6.625
Chicago W18	6.625
Cleveland A7, C20	6.625
Detroit R7	6.625
Detroit B5, P17	6.825
Donora,Pa. A7	6.625
Elyria,O. W8	6.625
Gary,Ind. R2	6.625
GreenBay,Wis. F7	6.625
Hammond,Ind. L2, M13	6.625
Hartford,Conn. R2	6.925
Harvey,Ill. B5	6.625
Lackawanna,N.Y. B2	6.625
LosAngeles S30	8.30
Mansfield,Mass. B5	6.925
Massillon,O. R2, R8	6.625
Midland,Pa. C18	6.625
Monaca,Pa. S17	6.625
Newark,N.J. W18	6.80
Plymouth,Mich. P5	6.825
So.Chicago W14	6.625
SpringCity,Pa. K3	6.80
Struthers,O. Y1	6.625
Warren,O. C17	6.625
Waukegan,Ill. A7	6.625
Worcester,Mass. A7	6.925
Youngstown F3, Y1	6.625

BARS, C.F. Loaded Alloy

Ambridge,Pa. W18	7.525
Camden,N.J. P13	7.70
Carnegie,Pa. C12	7.525
Chicago W18	7.525
Cleveland C20	7.525
Monaca,Pa. S17	7.525
Newark,N.J. W18	7.70
SpringCity,Pa. K3	7.70
Warren,O. C17	7.525

BARS, Reinforcing (To Fabricators)

Ala.City,Ala. R2	4.30
Atlanta A11	4.50
Birmingham C15	4.30
Buffalo R2	4.30
Cleveland R2	4.30
Emeryville,Calif. J7	5.05
Fairfield,Ala. T2	4.30
FairlessHills,Pa. U5	4.45
Fontana,Calif. K1	5.00
Ft.Worth,Tex.(42) T4	4.90
Gary,Ind. U5	4.30
Houston S5	4.55

Ind.Harbor,Ind. I-2, Y1 .4.30
Johnstown,Pa. B2 .....4.30
KansasCity,Mo. S5 .....4.55
Lackawanna,N.Y. B2 ...4.30
LosAngeles B3 .....5.00
Milton,Pa. M18 .....4.30
Minnequa,Colo. C10 ....4.75
Niles,Calif. P1 .....5.00
Pittsburg,Calif. C11 ....5.00
Pittsburgh J5 .....4.30
Portland,Oreg. O4 .....5.05
SandSprings,Okla. S5 ...4.80
Seattle B3, N14, P23 ...5.05
So.Chicago R2 .....4.30
So.Duquesne,Pa. U5 ....4.30
So.SanFrancisco B3 ....5.05
SparrowsPoint,Md. B2 ..4.30
Sterling,Ill.(1) N15 ....4.30
Sterling,Ill. N15 .....4.40
Struthers,O. Y1 .....4.30
Torrance,Calif. C11 ....5.00
Youngstown R2, U5 ....4.30

BARS, Reinforcing
(Fabricated; to Consumers)

Johnstown,Pa. ½-1" B2..5.70
KansasCity,Kans. S5 ...6.50
LosAngeles B3 .....5.95
Marion,O. P11 .....5.55
Pittsburgh J5, U8 .....5.72
Seattle B3, N14, P23 ...6.15
So.SanFrancisco B3 ....6.00
SparrowsPt. ½-1" B2 ..5.70
Williamsport,Pa. S19 ...5.60

RAIL STEEL BARS

Avis,Pa.(3) J8 .....4.25
ChicagoHts.(3) C2, I-2..4.20
ChicagoHts.(4) C2, I-2..4.30
Ft.Worth,Tex.(26) T4 ..4.75
Franklin,Pa.(3) F5 .....4.20
Franklin,Pa.(4) F5 .....4.30
Marion,O.(3) P11 .....4.15
Moline,Ill.(3) R2 .....4.30
Tonawanda(3) B12 .....4.15
Tonawanda(4) B12 .....4.30
Williamsport,Pa.(3) S19.4.30

BARS, Wrought Iron

Economy,Pa.(S.R.) B14 10.85
Economy,Pa.(D.R.) B14 13.50
Economy(Staybolt) B14 13.80
McK.Rks(S.R.) L5 ....10.85
McK.Rks.(D.R.) L5 ...14.75
McK.Rks.(Staybolt) L5 16.25

SHEETS

SHEETS, Hot-Rolled Steel
(18 Gage and Heavier)

Ala.City,Ala. R2 .....4.05
Allenport,Pa. P7 .....4.05
Ashland,Ky.(8) A10 ....4.05
Cleveland J5, R2 .....4.05
Conshohocken,Pa. A3 ...4.15
Detroit(8) M1 .....4.15
Ecorse,Mich. G5 .....4.15
Fairfield,Ala. T2 .....4.05
FairlessHills,Pa. U5 ....4.10
Fontana,Calif. K1 .....4.825
Gary,Ind. U5 .....4.05
Geneva,Utah C11 .....4.15
GraniteCity,Ill. G4 .....4.25
Ind.Harbor,Ind. I-2, Y1.4.05
Irvin,Pa. U5 .....4.05
Kokomo,Ind. C16 .....4.15
Lackawanna,N.Y. B2 ...4.05
Mansfield,O. E6 (37) ...4.05
Mansfield,O. E6 (38) ...4.80
Munhall,Pa. U5 .....4.05
Newport,Ky. N9 .....4.05
Niles,O. N12 .....4.05
Pittsburg,Calif. C11 ....4.75
Pittsburgh J5 .....4.05
Portsmouth,O. P12 .....4.05
Riverdale,Ill. A1 .....4.05
Sharon,Pa. S3 .....4.05
So.Chicago,Ill. W14 ....4.05
SparrowsPoint,Md. B2 ..4.05
Steubenville,O. W10 ....4.05
Warren,O. R2 .....4.05
Weirton,W.Va. W6 .....4.05
Youngstown U5, Y1 ....4.05

SHEETS, H.R. (19 Ga. & lighter)

Ala.City,Ala. R2 .....5.35
Kokomo,Ind. C16 .....5.20
Niles,O. N12 .....4.95

SHEETS, H.R. Alloy

Ind.Harbor,Ind. Y1 .....5.80
Youngstown Y1 .....5.80

SHEETS, H.R. (14 Ga. & heavier)
High-Strength Low-Alloy

Cleveland J5, R2 .....6.10
Conshohocken,Pa. A3 ...6.15
Ecorse,Mich. G5 .....6.20
Fairfield,Ala. T2 .....6.10
FairlessHills,Pa. U5 ....6.15
Fontana,Calif. K1 .....6.875
Gary,Ind. U5 .....6.10
Ind.Harbor,Ind. I-2, Y1.6.10
Irvin,Pa. U5 .....6.10
Lackawanna(35) B2 ....6.10
Munhall,Pa. U5 .....6.10
Pittsburgh J5 .....6.10
Sharon,Pa. S3 .....6.10
So.Chicago,Ill. U5 .....6.10
SparrowsPoint(36) B2 ..6.10
Warren,O. R2 .....6.10
Weirton,W.Va. W6 .....6.10
Youngstown U5, Y1 ....6.10

SHEETS, Hot-Rolled Ingot Iron
(18 Gage and Heavier)

Ashland,Ky.(8) A10 ....4.30
Cleveland R2 .....4.65
Ind.Harbor,Ind. I-2 ....4.30
Warren,O. R2 .....4.65

SHEETS, Cold-Rolled Steel
(Commercial Quality)

Allenport,Pa. P7 .....4.95
Cleveland J5, R2 .....4.95
Conshohocken,Pa. A3 ...5.00
Ecorse,Mich. G5 .....5.05
Fairfield,Ala. T2 .....4.95
FairlessHills,Pa. U5 ....5.00
Follansbee,W.Va. F4 ...4.95
Fontana,Calif. K1 .....6.05
Gary,Ind. U5 .....4.95
GraniteCity,Ill. G4 .....5.15
Ind.Harbor,Ind. I-2, Y1.4.95
Irvin,Pa. U5 .....4.95
Lackawanna,N.Y. B2 ...4.95
Middletown,O. A10 .....4.95
Newport,Ky. N9 .....4.95
Pittsburg,Calif. C11 ....5.90
Pittsburgh J5 .....4.95
Portsmouth,O. P12 .....4.95
SparrowsPoint,Md. B2 ..4.95
Warren,O. R2 .....4.95
Weirton,W.Va. W6 .....4.95
Youngstown Y1 .....4.95

SHEETS, Cold-Rolled
High-Strength Low-Alloy

Cleveland J5, R2 .....7.50
Ecorse,Mich. G5 .....7.60
FairlessHills,Pa. U5 ....7.55
Fontana,Calif. K1 .....8.55
Gary,Ind. U5 .....7.50
IndianaHarbor,Ind. Y1 ..7.50
Irvin,Pa. U5 .....7.50
Lackawanna(37) B2 .....7.50
Pittsburgh J5 .....7.50
SparrowsPoint(38) B2 ..7.50
Warren,O. R2 .....7.50
Weirton,W.Va. W6 .....7.50
Youngstown Y1 .....7.50

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....5.55
Middletown,O. A10 .....5.45
Warren,O. R2 .....5.55

SHEETS, Culvert	Cu Alloy	Cu Fe
Ashland,Ky.	A10 6.50	....
Canton,O.	R2 ...6.50	7.10
Fairfield	T2 .....5.70	....
Gary,Ind.	U5 .....5.70	5.95
Ind.Harbor	I-2 ..5.70	5.95
Irvin,Pa.	U5 .....5.70	....
Kokomo,Ind.	C16..5.80	....
MartinsFry.,O.	W10 5.70	....
Newport,Ky.	N9 ..5.70	5.95
Pitts.,Calif.	C11..6.45	....
SparrowsPt.	B2 ..5.70	....

SHEETS, Culvert—Puro Iron

Ashland,Ky. A10 .....6.75
Gary,Ind. U5 .....5.95
MartinsFerry,O. W10 ...5.95

SHEETS, Galvanized Steel
Hot-Dipped

Ala.City,Ala. R2 .....5.45‡
Ashland,Ky. A10 .....5.45*
Butler,Pa. A10 .....5.45†
Canton,O. R2 .....5.45‡
Delphos,O. N16 .....6.10‡
Dover,O. R1 .....5.45‡
Fairfield,Ala. T2 .....5.45†
Gary,Ind. U5 .....5.45*
GraniteCity,Ill. G4 ....5.65‡
Ind.Harbor,Ind. I-2 ...5.45†
Irvin,Pa. U5 .....5.45†
Kokomo,Ind. C16 .....5.55‡
MartinsFerry,O. W10 ..5.45*
Middletown,O. A10 ....5.45†
Newport,Ky. N9 .....5.45†
Niles,O. N12 .....5.45‡
Pittsburg,Calif. C11 ....6.20*
SparrowsPt.,Md. B2 ....5.45‡
Weirton,W.Va. W6 ....5.45*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Wall Casing

Fontana,Calif. K1 .....6.325

SHEETS, Galvanized
High-Strength Low-Alloy

Irvin,Pa. U5 .....8.20
SparrowsPoint(39) B2 ..8.20

SHEETS, Galvannealed Steel

Canton,O. R2 .....5.85
Irvin,Pa. U5 .....5.85
Kokomo,Ind. C16 .....6.20
Newport,Ky. N9 .....5.85
Niles,O. N12 .....5.85

SHEETS, Galvanized Ingot Iron

Ashland,Ky.(8) A10 ....5.70
Canton,O. R2 .....6.20

SHEETS, Galvanized
Ingot Iron
(Hot-dipped Continuous)

Ashland,Ky. A10 .....5.70
Butler,Pa. A10 .....5.70
Middletown,O. A10 .....5.70

SHEETS, Electrogalvanized

Cleveland(28) R2 .....6.30
Niles,O.(28) R2 .....6.30
Weirton,W.Va. W6 .....6.15

SHEETS, Aluminum Coated

Butler,Pa. A10 .....8.625

SHEETS, Enameling Iron

Ashland,Ky.(8) A10 ...5.375
Cleveland R2 .....5.375
Gary,Ind. U5 .....5.375
GraniteCity,Ill. G4 ....5.575
Ind.Harbor,Ind. I-2 ...5.375
Irvin,Pa. U5 .....5.375
Middletown,O. A10 ....5.375
Niles,O. N12 .....5.375
Youngstown Y1 .....5.375

BLUED STOCK, 29 Ga.

Follansbee,W.Va. F4 ..7.375
Follansbee(23) F4 .....6.60
Yorkville,O. W10 .....7.375

SHEETS, Long Terne Steel
(Commercial Quality)

BeechBottom,W.Va. W10 5.85
Gary,Ind. U5 .....5.85
Mansfield,O. E6 .....5.85
Middletown,O. A10 .....5.85
Niles,O. N12 .....5.85
Weirton,W.Va. W6 .....5.85

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 .....6.25

Key to Producers

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Co.
A6 American Shim Steel Co.
A7 American Steel & Wire
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.

B1 Babcock & Wilcox Co.
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B11 Buffalo Bolt Co., Div. Buffalo-Eclipse Corp.
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C5 Central Iron & Steel Div. Barium Steel Corp.
C7 Cleve. Cold Rolling Mills
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div. H. K. Porter Co. Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Steel Products Dept. Wickwire Spencer Steel Division
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C31 Chester Blast Furnace Inc.

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel
D4 Disston & Sons, Henry
D6 Driver Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas & Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Inc.
F3 Fitzsimons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G2 Globe Iron Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins, E., Steel Tube
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M13 Monarch Steel Div., Jones & Laughlin Steel Corp.
M14 McInnes Steel Co.
M16 Md. Fine & Special. Wire
M17 Metal Forming Corp.
M18 Milton Steel Prod. Div., Merritt-Chapman & Scott

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div.
N5 Nelsen Steel & Wire Co.
N6 NewEng.High Carb. Wire
N8 Newman-Crosby Steel
N9 Newport Steel Corp.
N12 Niles Rolling Mill Div.
N14 Nrthwst.Steel Roll. Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.
N19 Northeastern Steel Corp.

O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Division Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P23 Pacific Steel Rolling

R1 Reeves Steel & Mfg. Co.
R3 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 RellanceDiv.,Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Steel Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Products
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Corp.

T2 Tenn. Coal & Iron Div.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Strip Division, Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.
T13 Tube Methods Inc.

U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div.

V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Steel Co.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W.Va. Steel & Mfg. Co.
W8 West.Auto.Mach.Screw
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
W19 Worcester Pressed Steel

Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City, Ala.(27) R2 ...4.05
Allenport,Pa. P7 ...4.05
Alton,Ill. L1 ...4.225
Ashland,Ky.(8) A10 ...4.05
Atlanta A11 ...4.25
Bessemer,Ala. T2 ...4.05
Birmingham C15 ...4.05
Bridgeport,Conn. N19 ...4.35
Buffalo(27) R2 ...4.05
Conshohocken,Pa. A3 ...4.10
Detroit M1 ...4.15
Ecorse,Mich. G5 ...4.15
Fairfield,Ala. T2 ...4.05
Fontana,Calif. K1 ...4.825
Gary,Ind. U5 ...4.05
Ind.Harbor,Ind. I-2 Y1 4.05
Johnstown,Pa.(25) B2 ...4.05
Lackaw'na,N.Y.(25) B2 4.05
LosAngeles(25) B3 ...4.80
Milton,Pa. M18 ...4.05
Minnequa,Colo. C10 ...5.15
N.Tonawanda,N.Y. B11 ..4.05
Pittsburg,Calif. C11 ...4.80
Portsmouth,O. P12 ...4.05
Riverdale,Ill. A1 ...4.05
SanFrancisco 87 ...5.00
Seattle(25) B3, P23 ...5.05
Seattle N14 ...5.05
Sharon,Pa. S3 ...4.05
So.Chicago,Ill. W14 ...4.05
So.SanFrancisco(25) B3 4.80
SparrowsPoint,Md. B2 ...4.05
Sterling(1) N15 ...4.05
Sterling,Ill. N15 ...4.15
Torrance,Calif. C11 ...4.80
Warren,O. R2 ...4.05
Weirton,W.Va. W6 ...4.05
Youngstown U5 ...4.05

STRIP, Hot-Rolled Alloy

Bridgeport,Conn. N19 ..7.00
Carnegie,Pa. S18 ...6.70
Fontana,Calif. K1 ...8.10
Gary,Ind. U5 ...6.70
Ind.Harbor,Ind. Y1 ...6.70
LosAngeles B3 ...7.90
Newport,Ky. N9 ...6.70
Seattle P23 ...7.80
Sharon,Pa. S3 ...6.70
So.Chicago W14 ...6.70
Youngstown U5, Y1 ...6.70

STRIP, Hot-Rolled High-Strength Low-Alloy

Bessemer,Ala. T2 ...6.15
Conshohocken,Pa. A3 ..6.15
Ecorse,Mich. G5 ...6.25
Fairfield,Ala. T2 ...6.15
Fontana,Calif. K1 ...7.25
Gary,Ind. U5 ...6.15
Houston 85 ...6.40
Ind.Harbor,Ind. I-2, Y1.6.15
KansasCity,Mo. 85 ...6.40
Lackawanna,N.Y. B2 ...6.15
LosAngeles(25) B3 ...6.90
Seattle(25) B3, P23 ...7.15
Sharon,Pa. S3 ...6.15
So.SanFrancisco(25) B3 6.90
SparrowsPoint,Md. B2 ..6.15
Warren,O. R2 ...6.15
Weirton,W.Va. W6 ...6.15
Youngstown U5, Y1 ...6.15

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ...4.30
Warren,O. R2 ...4.65

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6 ...5.75
Baltimore T6 ...5.75
Boston T6 ...6.30
Cleveland A7, J5 ...5.75
Conshohocken,Pa. A3 ...5.80
Dearborn,Mich. D3 ...5.85
Detroit D2, M1, P20 ...5.85
Dover,O. G6 ...5.75
Ecorse,Mich. G5 ...5.85
Follansbee,W.Va. F4 ...5.75
Fontana,Calif. K1 ...7.65
FranklinPark,Ill. T6 ...5.85
Ind.Harbor,Ind. I-2 ...5.85
Ind.Harbor,Ind. Y1 ...5.75
Indianapolis C8 ...5.90
Lackawanna,N.Y. B2 ...5.75
LosAngeles C1 ...7.80
Middletown,O. A10 ...5.75
NewBedford,Mass. R10..6.20
NewBritain(10) S15 ...5.75
NewCastle,Pa. B4, E5 ..5.75
NewHaven,Conn. A7 ...6.50
NewHaven,Conn. D2 ...6.20
NewKensington,Pa. A6 ..5.75
Pawtucket,R.I. R3 ...6.40
Pawtucket,R.I. N8 ...6.30
Pittsburgh J5 ...5.75
Portsmouth,O. P12 ...5.75
Riverdale,Ill. A1 ...5.85
Rome,N.Y.(32) R6 ...5.75
Sharon,Pa. S3 ...5.75
SparrowsPoint,Md. B2 ..5.75
Trenton,N.J.(31) R5 ...7.30
Wallingford,Conn. W2 ..6.20
Warren,O. B9, R2, T5..5.75
Weirton,W.Va. W6 ...5.75
Worcester,Mass. A7 ...6.60
Youngstown C8, Y1 ...5.75

STRIP, Cold-Rolled Alloy

Boston T6 ...12.80
Carnegie,Pa. S18 ...12.45
Cleveland A7 ...12.45
Dover,O. G6 ...12.45
Fontana,Calif. K1 ...14.55
FranklinPark,Ill. T6 ..12.45
Harrison,N.J. C18 ...12.45
Pawtucket,R.I. N8 ...12.80
Sharon,Pa. S3 ...12.45
Worcester,Mass. A7 ...12.75
Youngstown C8 ...12.90

STRIP, Cold-Rolled High-Strength Low-Alloy

Cleveland A7, J5 ...8.60
Dearborn,Mich. D3 ...8.70
Dover,O. G6 ...8.60
Ecorse,Mich. G5 ...8.70
Ind.Harbor,Ind. Y1 ...8.60
Lackawanna,N.Y. B2 ..8.425

STRIP, Cold-Finished Spring Steel (Annealed)

	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	5.75	8.35	9.30	11.45	14.15
Boston T6	6.30	8.35	9.30	11.45	14.15
Bristol,Conn. W1	...	...	9.30	11.45	...
Carnegie,Pa. S18	...	8.05	9.00	11.15	13.85
Cleveland A7	5.75	8.05	9.00	11.15	13.85
Cleveland C7	...	8.05	9.00	11.15	13.85
Dearborn,Mich. D3	5.85	8.25	9.20	....	....
Detroit D2	5.85	8.25	9.20	10.95	....
Dover,O. G6	5.85	8.05	9.00	11.15	13.85
FranklinPark,Ill. T6	5.85	8.05	9.00	11.15	13.85
Harrison,N.J. C18	...	...	9.30	11.45	14.15
Indianapolis C8	6.00	8.20	9.00	11.15	13.85
NewBritain,Conn.(10) S15	5.75	8.05	9.00	11.15	13.85
NewCastle,Pa. B4	5.75	8.05	9.00	11.15	....
NewCastle,Pa. E5	5.75	8.05	9.00	11.15	13.85
NewHaven,Conn. D2	6.20	8.35	9.30	11.25	....
NewKensington,Pa. A6	5.75	8.05	9.00	11.15	....
NewYork W3	...	8.35	9.30	11.45	14.15
Pawtucket,R.I. N8	6.30	8.35	9.30	11.45	14.15
Riverdale,Ill. A1	5.85	8.05	9.00	11.15	13.85
Rome,N.Y.(32) R6	5.75	8.05	9.00	10.96	13.25
Sharon,Pa. S3	5.75	8.05	9.00	11.15	13.85
Trenton,N.J. R5	...	8.35	9.30	11.45	14.15
Wallingford,Conn. W2	6.20	8.35	9.30	11.45	14.15
Warren,O. T5	5.75	8.05	9.00	11.15	13.85
Weirton,W.Va. W6	5.75	8.05	9.00	11.15	13.85
Worcester,Mass. A7, T6	6.60	8.35	9.30	11.45	14.15
Youngstown C8	5.85	8.05	9.00	11.15	13.85

Spring Steel (Tempered)

Bristol,Conn. W1	...	...	12.90	15.60	....
Buffalo W12	...	...	12.90	....	....
FranklinPark,Ill. T6	...	...	13.40	16.10	19.50
Harrison,N.J. C18	...	...	12.90	15.60	19.00
NewYork W3	...	...	12.90	15.60	19.00
Trenton,N.J. R5	...	...	12.90	15.60	19.00
Worcester,Mass. A7, T6	...	...	12.90	15.60	19.00
Worcester,Mass. W12	...	...	12.90	....	....
Youngstown C8	...	...	13.25	15.95	19.35

STRIP, Electrogalvanized

Cleveland A7 ...5.75*
Dover,O. G6 ...5.75*
Riverdale,Ill. A1 ...5.85*
Youngstown C8 ...5.75*
Warren,O. B9, T5 ...5.75*
Weirton,W.Va. W6 ...5.75*
Worcester,Mass. A7 ...6.60*

*Plus galvanizing extras.

Strip, Galvanized (Continuous)

Sharon,Pa. S3 ...6.15
Warren,O. B9 ...6.15

TIGHT COOPERAGE HOOP

Atlanta A11 ...4.775
Riverdale,Ill. A1 ...4.625
Sharon,Pa. S3 ...4.475
Youngstown U5 ...4.475

SILICON STEEL

H.R. SHEETS (22 Ga., cut lengths)

	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	....	9.10	10.10	11.00
Brackenridge,Pa. A4	....	....	9.10	10.10	11.00
Mansfield,O. E6	8.025	8.50	9.10	10.10	11.00
Newport,Ky. N9	8.025	8.50	9.10	10.10	11.00
Niles,O. N12	8.025	8.50	9.10	10.10	....
Vandergrift,Pa. U5	....	8.50	9.10	10.10	11.00
Warren,O. R2	8.025	8.50	9.10	10.10	11.00
Zanesville,O. A10	....	8.50	9.10	10.10	11.00

C.R. COILS & CUT LENGTHS, (22 Ga.)

Fully Processed (Semiprocessed ½c lower)

	Field	Armature	Electric	Motor	Dynamo
Brackenridge,Pa. A4	....	....	9.85	10.85	11.75
GraniteCity,Ill. G4	8.425*	8.95*	9.50*	10.50*	....
IndianaHarbor,Ind. I-2	8.225	8.75*	9.35*	....	....
Vandergrift,Pa. U5	....	9.25†	9.85†	10.85†	11.75†
Vandergrift,Pa. U5	8.225*	8.75*	9.35*	10.35*	11.25*
Warren,O. R2	8.225†	9.25	9.85	10.85	11.75
Zanesville,O. A10	....	9.25	9.85	10.85	11.75

	Transformer Grade			
H.R. SHEETS (22 Ga., cut lengths)	**T-72**	**T-65**	**T-58**	**T-52**
BeechBottom,W.Va. W10	11.95	12.50	13.00	14.00
Brackenridge,Pa. A4	11.95	....	....	....
Newport,Ky. N9	11.95	....	....	....
Vandergrift,Pa. U5	11.95	12.50	13.00	14.00
Zanesville,O. A10	11.95‖	12.50‖	13.00‖	14.00‖

C.R. COILS & CUT LENGTHS (22 Ga.)

	Grain Oriented				
	T-100	**T-90**	**T-80**	**T-73**	**T-72**
Brackenridge,Pa. A4	....	15.00	16.60	17.10	....
Butler,Pa. A10	....	....	16.60	17.10	....
Vandergrift,Pa. U5	14.00	15.00	16.60	17.10	12.70
Warren,O. R2	....	....	....	....	12.70‡

* Semiprocessed. † Fully processed only. ‡ Coils annealed; semiprocessed ½c lower. ‖ Coils, ¾-cent higher.

TIN MILL PRODUCTS

TIN PLATE Electrolytic (Base Box)

	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$7.50	$7.75	$8.15
Fairfield,Ala. T2	7.60	7.85	8.25
FairlessHills,Pa. U5	7.60	7.85	8.25
Gary,Ind. U5	7.50	7.75	8.15
GraniteCity,Ill. G4	7.60	7.85	8.25
IndianaHarbor,Ind. I-2, Y1	7.50	7.75	8.15
Irvin,Pa. U5	7.50	7.75	8.15
Niles,O. R2	7.50	7.75	8.15
Pittsburg,Calif. C11	8.25	8.50	8.90
SparrowsPoint,Md. B2	7.60	7.85	8.25
Weirton,W.Va. W6	7.50	7.75	8.15
Yorkville,O. W10	7.50	7.75	8.15

ELECTROTIN (22-27 Gage; Dollars per 100 lb)

Aliquippa,Pa. J5	6.175	....	....
Niles,O. R2	6.175	6.375	6.575

TINPLATE,American Coke (Base Box)	**1.25 lb**	**1.50 lb**
Aliquippa,Pa. J5	$8.80	$9.05
Fairfield,Ala. T2	8.90	9.15
Fairless,Pa. U5	8.90	9.15
Gary,Ind. U5	8.80	9.05
Ind.Har. I-2, Y1	8.80	9.05
Irvin,Pa. U5	8.80	9.05
Pitts.Cal. C11	9.55	9.80
Sp.Pt.,Md. B2	8.90	9.15
Warren,O. R2	8.80	9.05
Weirton,W.Va. W6	8.80	9.05
Yorkville,O. W10	8.80	9.05

BLACK PLATE (Base Box)

Aliquippa,Pa. J5 ...$6.60
Fairfield,Ala. T2 ...6.70
FairlessHills,Pa. U5 ...6.70
Gary,Ind. U5 ...6.60
GraniteCity,Ill. G4 ...6.70
Ind.Harbor,Ind. I-2, Y1.6.60
Irwin,Pa. U5 ...6.60
Niles,O. R2 ...6.60
Pittsburg,Calif. C11 ...7.35
SparrowsPoint,Md. B2. .6.70
Warren,O. R2 ...6.60
Weirton,W.Va. W6 ...6.60
Yorkville,O. W10 ...6.60

HOLLOWARE ENAMELING Black Plate (29 Gage)

Follansbee,W.Va. F4 ...6.20
Gary,Ind. U5 ...6.20
GraniteCity,Ill. G4 ...6.30
Ind.Harbor,Ind. Y1 ...6.20
Irvin,Pa. U5 ...6.20
Yorkville,O. W10 ...6.20

MANUFACTURING TERNES (Special Coated; Base Box)

Gary,Ind. U5 ...$7.85
Irvin,Pa. U5 ...7.85
Yorkville,O. W10 ...7.85

MANUFACTURING TERNES (Light Coated, 6 lb; Base Box)

Yorkville,O. W10 ....$8.75

ROOFING SHORT TERNES (8 lb Coated)

Gary,Ind. U5 ...9.85

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ...5.75
Aliquippa,Pa. J5 ...5.75
Alton,Ill. L1 ...5.925
Atlanta A11 ...5.95
Bartonville,Ill. K4 ...5.85
Buffalo W12 ...5.75
Chicago W13 ...5.75
Cleveland A7, C20 ...5.75
Crawfordsville,Ind. M8..5.85
Donora,Pa. A7 ...5.75
Duluth,Minn. A7 ...5.75
Fairfield,Ala. T2 ...5.75
Fostoria,O.(24) S1 ...5.95
Houston 85 ...6.00
Jacksonville,Fla. M8 ...6.27
Johnstown,Pa. B2 ...5.75
Joliet,Ill. A7 ...5.75
KansasCity,Mo. 85 ...6.00
Kokomo,Ind. C16 ...5.85
LosAngeles B3 ...6.70
Minnequa,Colo. C10 ...6.00
Monessen,Pa. P7 ...5.75
Newark 6-8 ga. I-1 ...6.40
No.Tonawanda B11 ...5.75
Palmer,Mass. W12 ...6.05
Pittsburg,Calif. C11 ...6.70
Portsmouth,O. P12 ...5.75
Rankin,Pa. A7 ...5.75
So.Chicago,Ill. R2 ...5.75
So.SanFrancisco C10 ...6.70
SparrowsPoint,Md. B2 ..6.85
Sterling,Ill.(1) N15 ...5.75
Sterling,Ill. N15 ...5.85
Struthers,O. Y1 ...5.75
Waukegan,Ill. A7 ...5.75
Worcester,Mass. A7 ...6.05

WIRE, MB Spring, High Carbon

Aliquippa,Pa. J5 ...7.20
Alton,Ill. L1 ...7.375
Bartonville,Ill. K4 ...7.30
Buffalo W12 ...7.20
Cleveland A7 ...7.20
Donora,Pa. A7 ...7.20
Duluth,Minn. A7 ...7.20
Fostoria,O. S1 ...7.20
Johnstown,Pa. B2 ...7.20
LosAngeles B3 ...8.15
Milbury,Mass.(12) N6 ..7.50
Minnequa,Colo. C10 ...7.45
Monessen,Pa. P7, P16..7.20
Muncie,Ind. I-7 ...7.40
Palmer,Mass. W12 ...7.50
Pittsburg,Calif. C11 ...8.15
Portsmouth,O. P12 ...7.20
Roebling,N.J. R5 ...7.50
So.Chicago,Ill. R2 ...7.20
So.SanFrancisco C10 ...8.15
SparrowsPt.,Md. B2 ...7.30
Struthers,O. Y1 ...7.20
Trenton,N.J. A7 ...7.50
Waukegan,Ill. A7 ...7.20
Worcester A7,J4,T6,W12 7.50

WIRE, Upholstery Spring

Aliquippa,Pa. J5 ...6.90
Alton,Ill. L1 ...7.075
Buffalo W12 ...6.90
Cleveland A7 ...6.90
Donora,Pa. A7 ...6.90
Duluth,Minn. A7 ...6.90
Johnstown,Pa. B2 ...6.90
KansasCity,Mo. 85 ...7.50
LosAngeles B3 ...7.85
Minnequa,Colo. C10 ...7.075
Monessen,Pa. P7, P16..6.90
NewHaven,Conn. A7 ...7.20
Palmer,Mass. W12 ...7.20
Pittsburg,Calif. C11 ...7.85
Portsmouth,O. P12 ...6.90
Roebling,N.J. R5 ...7.20
So.Chicago,Ill. R2 ...6.90
So.SanFrancisco C10 ...7.85
SparrowsPoint,Md. B2 ..7.00
Struthers,O. Y1 ...6.90
Trenton,N.J. A7 ...7.20
Waukegan,Ill. A7 ...6.90
Worcester,Mass. A7 ...7.20

WIRE, Fine & Weaving(6" Coils)

Alton,Ill. L1 ...11.375
Bartonville,Ill. K4 ...11.30
Buffalo W12 ...11.20
Chicago W13 ...11.20
Cleveland A7 ...11.20
Crawfordsville,Ind. M8.11.30
Fostoria,O. S1 ...11.20
Jacksonville,Fla. M8 ..11.73
Johnstown,Pa. B2 ...11.20
Kokomo,Ind. C16 ...11.20
Minnequa,Colo. C10 ...10.95
Monessen,Pa. P16 ...11.20
Muncie,Ind. I-7 ...11.40
Palmer,Mass. W12 ...11.50
Roebling,N.J. R5 ...11.50
So.SanFrancisco C10 ...11.55
Waukegan,Ill. A7 ...11.20
Worcester,Mass. A7,T6.11.50

WIRE, Galv'd ACSR for Cores

Bartonville,Ill. K4 ....9.90
Buffalo W12 ....9.90
Johnstown,Pa. B2 ....9.90
Minnequa,Colo. C10 ..10.025
Monessen,Pa. P16 ....9.90
Muncie,Ind. I-7 ....10.10
Portsmouth,O. P12 ....9.90
Roebling,N.J. R5 ....10.20
SparrowsPt.,Md. B2 ...10.00

ROPE WIRE (A)

Alton,Ill. L1 ....9.75
Bartonville,Ill. K4 ....9.75
Buffalo W12 ....9.75
Fostoria,O. S1 ....9.75
Johnstown,Pa. B2 ....9.75
Monessen,Pa. P7, P16 ..9.75
Muncie,Ind. I-7 ....9.95
Palmer,Mass. W12 ....10.05
Portsmouth,O. P12 ....9.75
Roebling,N.J. R5 ....10.05
SparrowsPt. B2 ....9.85
Struthers,O. Y1 ....9.75
Worcester J4, T6 ....9.65

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE

(Continued)

WIRE, Tire Bead

Alton,Ill. L1	13.25
Bartonville,Ill. K4	13.25
Monessen,Pa. P16	13.15
Portsmouth,O. P12	13.15
Roebling,N.J. R5	13.45

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	7.95
Baltimore T6	8.25
Buffalo W12	7.95
Cleveland A7	7.95
Crawfordsville,Ind. MS	8.05
Dover,O. G6	7.95
Fostoria,O. S1	7.95
FranklinPark,Ill. T6	8.05
Kokomo,Ind. C16	8.05
Massillon,O. R8	7.95
Milwaukee C23	8.15
Monessen,Pa. P7, P16	7.95
Pawtucket,R.I. NS	8.25
Rome,N.Y.(32) R6	7.95
Trenton,N.J. R5	8.25
Worcester A7, T6, W12	8.25

WIRE, Merchant Quality

(6 to 8 gage)	An'ld	Galv.
Ala.City,Ala. R2	6.90	7.30**
Aliquippa J5	6.90	7.425‡
Atlanta A11	7.00	7.55
Bartonville(48) K4	7.00	7.55
Buffalo W12	6.90	7.30†
Cleveland A7	6.90	....
Crawfordsville MS	7.00	7.55
Donora,Pa. A7	6.90	7.30†
Duluth,Minn. A7	6.90	7.30†
Fairfield T2	6.90	7.30†
Houston,Tex. S5	7.15	7.55†
Jacks'ville,Fla. MS	7.425	7.95
JohnstownB2(48)	6.90	7.45*
Joliet,Ill. A7	6.90	7.30†
KansasCity,Mo. S5	7.15	7.55†
Kokomo C16	7.00	7.40†
LosAngeles B3	7.85	....
Minnequa C10	7.15	7.55**
Monessen P7 (48)	6.90	7.45
Palmer,Mass. W12	7.20	7.60†
Pitts.,Calif. C11	7.85	8.25†
Portsmouth,O. P12	6.90	....
Rankin A7	6.90	7.30†
So.Chicago R2	6.90	7.30**
So.S.Fran. C10	7.85	8.25**
SparrwsPt.B2(48)	7.00	7.55*
Sterling(1)(48)N15	6.90	7.45
Struthers,O.(48)Y1	6.90	7.40‡
Worcester,Mass.A7	7.20	....

*Based on 11c zinc; †5c zinc; ‡Less than 10c zinc; **Subject to zinc equalization extras.

WOVEN Fence, 9-15½ Ga.

	Col.
Ala.City,Ala. R2	146**
Ala.City, 17 ga. R2	241**
Ala.City, 18 ga. R2	251**
Aliq'ppa,Pa.9-14½ga.J5	149‡
Atlanta A11	151
Bartonville,Ill. K4	151
Crawfordsville,Ind. MS	151
Donora,Pa. A7	146†
Duluth,Minn. A7	146†
Fairfield,Ala. T2	146†
Houston,Tex. S5	151†
Johnstown,Pa.(43) B2	149
Joliet,Ill. A7	146†
KansasCity,Mo. S5	151†
Kokomo,Ind. C16	148†
Minnequa,Colo. C10	151**
Monessen,Pa. 9 ga. P17	149
Pittsburg,Calif. C11	169†
Rankin,Pa. A7	146†
So.Chicago,Ill. R2	146**
Sterling,Ill.(1) N15	149

†Based on 5c zinc; *11c zinc; ‡10c zinc; **Subject to zinc equalization extras.

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	155
Atlanta A11	157
Bartonville,Ill. K4	157
Crawfordsville,Ind. MS	157
Donora,Pa. A7	155
Duluth,Minn. A7	155
Fairfield,Ala. T2	155
Joliet,Ill. A7	155
Houston S5	160
KansasCity,Mo. S5	160
Kokomo,Ind. C16	157
Minnequa,Colo. C10	160
Pittsburg,Calif. C11	179
So.Chicago,Ill. R2	156
So.SanFran.,Calif. C10	179
SparrowsPoint,Md. B2	157
Sterling,Ill.(1) N15	155

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	159**
Aliquippa J5	156‡
Atlanta A11	164
Bartonville,Ill. K4	164
Crawfordsville,Ind. MS	164
Donora,Pa. A7	159†
Duluth,Minn. A7	159†
Fairfield,Ala. T2	159†
Houston,Tex. S5	164†
Johnstown,Pa. B2	162*
Joliet,Ill. A7	159†
KansasCity,Mo. S5	164†
Kokomo,Ind. C16	161†
Minnequa,Colo. C10	164**
Monessen,Pa. P7	162
Pittsburg,Calif. C11	179†
Rankin,Pa. A7	159†
So.Chicago,Ill. R2	156**
So.SanFrancisco C10	179**
SparrowsPoint,Md. B2	164*
Sterling,Ill.(1) N15	162

†Based on 5c zinc; *11c zinc; ‡10c zinc; **Subject to zinc equalization extras.

WIRE (16 Gage)

	An'ld Stone	Galv. Stone
Ala.City R2	13.15	14.70**
Bartonville K4	13.25	15.10
Buffalo W12	13.15	....
Cleveland A7	13.15	....
Crawfrdsville MS	13.25	15.10
Fostoria,O. S1	13.25	14.80†
Johnstown B2	13.15	15.00*
Kokomo C16	13.25	14.80†
Minnequa C10	13.40	15.10**
Palmer,Mas.W12	13.15	14.70†
Pitts.,Calif. C11	12.50	15.05†
So.Chicago R2	13.15	14.70
SparrowsPt. B2	13.25	15.10*
Sterling(1) N15	13.15	15.00
Waukegan A7	13.15	14.70†
Worcester A7	13.45	....

*Based on 11c zinc; †5c zinc; ‡10c zinc; **Subject to zinc equalization extras.

NAILS, Stock

To Dealers & Mfrs. (7)	Col.
AlabamaCity,Ala. R2	137
Aliquippa,Pa. J5	137
Atlanta A11	139
Bartonville,Ill. K4	139
Chicago,Ill. W13	137
Cleveland A9	137
Crawfordsville,Ind. MS	139
Donora,Pa. A7	137
Duluth,Minn. A7	137
Fairfield,Ala. T2	137
Galveston,Tex. D7	145
Houston,Tex. S5	142
Johnstown,Pa. B2	137
Joliet,Ill. A7	137
KansasCity,Mo. S5	142
Kokomo,Ind. C16	139
Minnequa,Colo. C10	142
Monessen,Pa. P7	137
Pittsburg,Calif. C11	156
Rankin,Pa. A7	137
So.Chicago,Ill. R2	137
SparrowsPt.,Md. B2	139
Sterling,Ill.(1) N15	137
Worcester,Mass. A7	143

NAILS, CUT (100 lb keg)

To Dealers (33)	
Conshohocken,Pa. A3	$8.30
Wheeling,W.Va. W10	8.30

STAPLES, Polished Stock

To Dealers & Mfrs. (7)	Col.
Aliquippa,Pa. J5	138
Atlanta A11	140
Bartonville,Ill. K4	139
Crawfordsville,Ind. MS	139
Donora,Pa. A7	138
Duluth,Minn. A7	138
Fairfield,Ala. T2	138
Johnstown,Pa. B2	138
Joliet,Ill. A7	138
Kokomo,Ind. C16	139
Minnequa,Colo. C10	142
Monessen,Pa. P7	137
Pittsburg,Calif. C11	157
Rankin,Pa. A7	138
SparrowsPt.,Md. B2	140
Sterling,Ill.(1) N15	137
Worcester,Mass. A7	144

FENCE POSTS

	Col.
ChicagoHts.,Ill. C2, I-2	150
Duluth,Minn. A7	150
Franklin,Pa. F5	150
Johnstown,Pa. B2	150
Marion,O. P11	150
Minnequa,Colo. C10	155
Moline,Ill. R2	155
So.Chicago,Ill. R2	150
Tonawanda,N.Y. B12	150
Williamsport,Pa. S19	150

BOLTS, NUTS

CARRIAGE, MACHINE BOLTS

(Base discounts, per cent off list, f.o.b. midwestern plants)

4 in. and shorter:	
½-in. & smaller diam	2
Over 4 in. through 6 in.:	
½ in. & smaller diam	+3
6 in. and shorter:	
⅝-in. and ⅝-in.	+4
¾ in. and larger	+6
Longer than 6 in.:	
All diameters	+15
Lag bolts, all diams:	
6 in. and shorter	6
Over 6 in. long	+2
Ribbed Necked Carriage	+4
Blank	10
Plow	23
Step, Elevator, Tap and Sleigh Shoe	10
Tire Bolts	+3
Boiler & Fitting-Up Bolts	21

NUTS

H.P. and C.P., regular & heavy:	
Square, all sizes	55
H.P., Hex, regular & heavy:	
⅝" and smaller	55
⅞" to 1¼", inclusive	58
1⅜" to 1½", inclusive	60
1⅝" and larger	55
C.P. Hex regular & heavy:	
All sizes	55
Hot Galv. Nuts (all types):	
⅝" or smaller	38
⅞" to 1½", inclusive	41
Finished Hex Nuts:	
New standard, all sizes	55
Semifinished & Slotted Hex:	
Regular and heavy, all sizes	55

SQUARE HEAD SET SCREWS

(1035 steel; packaged; per cent off list)

1 in. diam x 6 in. and shorter	34
1 in. and smaller diam x over 6 in.	20

HEADLESS SET SCREWS

(Packaged; per cent off list)

No. 10 and smaller	34
¼ in. diam & larger	14
N.F. thread, all diams.	8

STEEL STOVE BOLTS

(F.o.b. plant, per cent off list in packages)

Plain finish	43
Plated finishes	23

HEXAGON CAP SCREWS

(1020 steel; packaged; per cent off list)

6 in. or shorter:	
¼ in. through ⅝-in.	38
¾-in. through 1 in.	15
Longer than 6 in.:	
¼-in. through ⅝-in.	20
⅝-in. through 1 in.	7

RIVETS

F.o.b. Cleveland, and/or freight equalized with Pittsburgh, f.o.b. Chicago, and/or freight equalized with Birmingham except where equalization is too great.

Structural ½-in. larger 9.25
$\frac{7}{16}$-in. under. List less 37%

WASHERS, WROUGHT

F.o.b. shipping point, to jobbers ..... List

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

OD In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	19.59	19.00
1¼	13	....	23.21	18.77
1½	13	21.40	25.65	20.75
1¾	13	25.28	30.31	24.52
2	13	29.33	33.97	27.48
2¼	13	31.91	38.26	30.95
2¼	12	34.63	41.52	33.59
2½	12	38.15	45.74	37.00
2¾	12	41.31	49.53	40.07
3	12	44.05	52.82	42.72

RAILWAY MATERIALS

	Standard No. 1	Standard No. 2	Standard All	Tee Rails 60 lb Under
RAILS				
Bessemer,Pa. U5	4.45	4.35	4.40	5.35
Ensley,Ala. T2	4.45	4.35	...	5.35
Fairfield,Ala. T2	...	...	...	5.35
Gary,Ind. U5	4.45	4.35	4.40	...
IndianaHarbor,Ind. I-2	4.45	4.35	4.40	...
Johnstown,Pa. B2	...	...	...	(16)5.35
Lackawanna,N.Y. B2	4.45	4.35	...	5.35
Minnequa,Colo. C10	4.45	4.35	...	5.85
Steelton,Pa. B2	4.45	4.35	...	5.35
Williamsport,Pa. S10	...	...	...	5.35

TIE PLATES

Fairfield,Ala. T2	5.275
Gary,Ind. U5	5.275
Ind.Harbor,Ind. I-2	5.275
Lackawanna,N.Y. B2	5.275
Minnequa,Colo. C10	5.275
Seattle B3	5.425
Steelton,Pa. B2	5.275
Torrance,Calif. C11	5.425

TRACK BOLTS (20) Treated

Cleveland R2	11.50
KansasCity,Mo. S5	11.50
Lebanon,Pa. B2	11.50
Minnequa,Colo. C10	11.50
Pittsburgh G3, P14	11.50
Seattle B3	12.00

AXLES

Ind.Harbor,Ind. S13	6.75
Johnstown,Pa. B2	6.75

JOINT BARS

Bessemer,Pa. U5	5.425
Fairfield,Ala. T2	5.425
Ind.Harbor,Ind. I-2	5.425
Joliet,Ill. U5	5.425
Lackawanna,N.Y. B2	5.425
Minnequa,Colo. C10	5.425
Steelton,Pa. B2	5.425

SCREW SPIKES

Cleveland R2	11.00

STANDARD TRACK SPIKES

Fairfield,Ala. T2	7.30
Ind.Harbor,Ind. I-2, Y1	7.30
KansasCity,Mo. S5	7.30
Lebanon,Pa. B2	7.30
Minnequa,Colo. C10	7.30
Pittsburgh J5	7.30
Seattle B2	7.80
So.Chicago,Ill. R2	7.30
Struthers,O. Y1	7.30
Youngstown R2	7.30

METAL POWDERS

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as otherwise noted)

Sponge iron:	Cents
98+% Fe, annealed	15.25
Unannealed:	
Minus 100 mesh	11.75
Minus 35 mesh	9.25
Minus 20 mesh	9.00
Swedish, c.l.f. N.Y., c.l., in bags	11.25
Domestic (Swedish), f.o.b. Riverton, N. J., in bags	9.50
Canadian, f.o.b. shipping point	9.50
Electrolytic iron:	
Melting stock, 99.91% Fe, irregular fragments of ⅛ in. x 1.3 in.	22.00
Annealed, 99.5% Fe	36.50
Unannealed (99+% Fe)	32.50
Unannealed (99+% Fe) (minus 325 mesh)	52.00
Powder Flakes (minus 16, plus 100 mesh)	31.00
Carbonyl† Iron:	
97.9-99.8% size 5 to 10 microns—83.00-148.00	
Aluminum:	
Atomized, 500 lb drums, frght. allowed:	
Carlots	32.20
Ton lots	34.20
Antimony, 500 lb lots	32.00*
Brass, 5000-lb lots	31.25-39.75†
Bronze, 5000-lb lots	51.50-54.75†
Copper:	
Electrolytic	13.75*
Reduced	13.75*
Lead	7.50*
Manganese:	
Minus 35 mesh	61.00
Minus 100 mesh	67.00
Minus 200 mesh	72.00
Nickel, unannealed	97.00
Nickel-Silver, 5000-lb lots	47.50-51.00
Phosphor-Bronze, ¼-ton lots	58.50
Silicon	43.50
Solder	7.00*
Stainless Steel, 302	94.00
Stainless Steel, 316	$1.25
Tin	14.50*
Zinc, 5000-lb lots	17.25-31.00†
Tungsten	Dollars
Melting grade, 99% 60 to 200 mesh:	
1000 lb and over	4.95
Less than 1000 lb	5.10
Chromium, electrolytic 99.2% Cr min.	3.50

*Plus cost of metal. †Depending on composition. ‡Depending on mesh. §70% Cu, 20% Zn, 10% Ni; **64% Cu, 18% Zn, 18% Ni.

Footnotes

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1¾" to 1 7/16"; 1 7/16" to 1 15/16" 4.75c; 1 15/16" to 7 5/16" 5.15c.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 Ga. and heavier.
(9) 6 in. and narrower.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass., base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.143 to 0.249 in.; for gage 0.142 and lighter, 5.80c.
(15) ¾" and thinner.
(16) 40 lb and under
(17) Flats only; 0.25 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(20) 0.25 off for untreated.
(21) New Haven, Conn., base.
(22) Del. San Francisco Bay area.
(23) 20 Ga. 26" wide.
(24) Deduct 0.10c, finer than 15 Ga.
(25) Bar mill bands.
(26) Reinforcing mill lengths, to fabricators; to consumers, 4.95c.
(27) Bar mill size.
(28) Bonderized.
(29) Youngstown base.
(30) Sheared; for universal mill add 0.45c for carbon, add 0.40c for alloy and 0.35c H.S.-L.A.
(31) Widths over ⅝-in.; 6.40c for widths ⅝-in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) To jobbers, deduct 20c.
(34) 9.60c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) 13 Ga. & heavier; 60" & narrower.
(38) 14 Ga. & lighter; 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.025"; 0.035" and heavier, 0.25c higher.
(41) 9.10c for cut lengths.
(42) Mill lengths, f.o.b. mill; deld. to mill zone or within switching limits, 5.10c.
(43) 9-14½ Ga.
(48) 6-7 Ga.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal tax.

Birmingham District	Basic	No. 2 Foundry	Malleable	Bessemer
AlabamaCity,Ala. R2	52.38	52.88	....	....
Birmingham R2	52.38	52.88	....	....
Birmingham U6	....	52.88	56.50†	....
Gadsden,Ala. R2	52.38	52.88	....	....
Cincinnati, deld.	....	60.58	....	....
Buffalo District				
Buffalo H1, R2	56.50	56.50	57.00	57.50
Tonawanda,N.Y. W13	56.00	56.50	57.00	....
No.Tonawanda,N.Y. T9	....	56.50	57.00	57.50
Boston, deld.	66.65	67.15	67.65	....
Rochester,N.Y., deld.	59.02	59.52	60.02	....
Syracuse,N.Y., deld.	60.12	60.62	61.12	....
Chicago District				
Chicago I-3	56.00	56.50	56.50	57.00
Chicago R2	56.00	....	56.50	....
Gary,Ind. U5	56.00	....	56.50	....
IndianaHarbor,Ind. I-2	56.00	....	56.50	....
So.Chicago,Ill. W14, Y1	56.00	56.50	56.50	....
So.Chicago,Ill. U5	56.00	....	56.50	57.00
Milwaukee,deld.	58.17	58.67	58.67	59.17
Muskegon,Mich., deld.	....	62.50	62.50	....
Cleveland District				
Cleveland A7, R2	56.00	56.50	56.50	57.00
Akron,O. deld.	58.75	59.25	59.25	59.75
Lorain,O. N3	56.00	....	....	57.00
Mid-Atlantic District				
Bethlehem,Pa. B2	58.00	58.50	59.00	59.50
NewYork, deld.	....	62.28	62.78	....
Newark, deld.	61.02	61.52	62.02	62.52
Birdsboro,Pa. B10	58.00	58.50	....	....
Chester,Pa. C31	....	48.50	49.00	....
Philadelphia, deld.	....	59.16	59.66	....
Steelton,Pa. B2	58.00	58.50	59.00	59.50
Swedeland,Pa. A3	58.00	58.50	59.00	59.50
Philadelphia, deld.	59.66	60.16	60.66	61.16
Troy,N.Y. R3	58.00	58.50	59.00	59.50
Pittsburgh District				
NevilleIsland,Pa. P6	56.00	56.50	56.50	57.00
Pittsburgh (N&B sides),				
Aliquippa, deld.	....	57.87	57.87	58.37
McKeesRocks, deld.	....	57.54	57.54	58.04
Lawrenceville,Homestead,				
Wilmerding,Monaca, deld.	....	58.16	58.16	58.66
Verona,Trafford, deld.	58.19	58.69	58.69	59.19
Brackenridge, deld.	58.45	58.95	58.95	59.45
Bessemer,Pa. U5	56.00	....	56.50	57.00
Clairton,Rankin,SoDuquesne,Pa. U5	56.00	....	....	....
McKeesport,Pa. N3	56.00	....	....	57.00
Midland,Pa. C18	56.00	....	....	....

Youngstown District	Basic	No. 2 Foundry	Malleable	Bessemer
Hubbard,O. Y1	....	....	56.50	....
Sharpsville,Pa. S6	56.00	56.50	56.50	57.00
Youngstown Y1	....	....	56.50	57.00
Youngstown U5	56.00	....	....	57.00
Mansfield,O. deld.	60.90	....	61.40	61.90
Duluth I-3	56.00	56.50	56.50	57.00
Erie,Pa. I-3	56.00	56.50	56.50	57.00
Everett,Mass. E1	60.50	61.00	61.50	....
Fontana,Calif. K4	62.00	62.50	....	....
Geneva,Utah C11	56.00	56.50	....	....
GraniteCity,Ill. G4	57.90	58.40	58.90	....
Ironton,Utah C11	56.00	56.50	....	....
LoneStar,Texas L6	52.00	52.50*	53.00	....
Minnequa,Colo. C10	58.00	59.00	59.00	....
Rockwood,Tenn. T2	....	52.50*	56.50	....
Toledo,O. I-3	56.00	56.50	56.50	57.00
Cincinnati, deld.	61.76	62.26	....	....

*Low phos, southern grade. †Phos, 0.30 max.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos iron on which base is 1.75-2.00%.
Phosphorus: Deduct 38 cents per ton for P content of 0.70% and over.
Manganese: Add 50 cents per ton for each 0.50% manganese over 1% or portion thereof.
Nickel: Under 0.50% no extra; 0.50-0.74%, inclusive, add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1 for each 0.5% Si; 75 cents for each 0.50% Mn over 1%)

Jackson,O. G2, J1	$85.00
Buffalo H1	66.25

ELECTRIC FURNACE SILVERY PIG IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.50 Si to 18%; $1 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

NiagaraFalls,N.Y. P15	$80.50
Keokuk,Iowa, (Open-hearth & Fdry, freight allowed K2	85.00
Keokuk, O.H. & Fdry, 12½ lb pigiets, 16% Si, frgt allowed K2	88.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Cleveland A7 (Intermediate)	$61.00
Lyles,Tenn. T3	70.00
Rockwood,Tenn. T3	70.00
Steelton,Pa. B2	64.00
Philadelphia, deld.	67.55
Troy,N.Y. R2	64.00

Warehouse Steel Products

Representative prices, cents per pound, subject to extras, f.o.b. warehouse. City delivery charges are 20 cents per 100 lb except Birmingham and St. Paul, 15 cents; Philadelphia, New York, Boston and Los Angeles, 10 cents; Buffalo, 25 cents on C.R. and galvanized sheets, C.F. and alloy bars and 30 cents on other commodities; Houston, Seattle, Spokane, Wash., no charge.

	SHEETS				STRIP		BARS			Standard Structural Shapes	PLATES	
	Hot-Rolled	Cold-Rolled	Gal. 10 Ga.†	Stainless Type 302‡§	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.‖	H.R. Alloy 4140††‖		Carbon	Floor
Baltimore	6.02	7.51	7.79	....	6.60	...	6.68	8.52¶	12.54	6.72	6.37	7.76
Birmingham	6.35	7.35	8.25§	....	6.60	...	6.50	9.10	....	6.65	6.65	8.45
Boston	7.38	8.23	9.52	45.28§	7.47	...	7.20	8.60	12.30	7.49	7.37	8.50
Buffalo	6.35	7.40	8.79	....	6.70	...	6.50	7.55	12.00	6.72	6.65	7.90
Charlotte, N. C.	6.95	7.80	8.69	....	6.90	...	7.10	8.37	....	7.10	7.10	8.37
Chicago	6.38	7.38	8.30	46.05	6.62	...	6.51	7.25	11.75	6.69	6.52	7.64
Cincinnati	6.49	7.37	8.30	46.10	6.86	...	6.75	7.55	12.00	6.86	6.81	7.89
Cleveland	6.38	7.38	8.25	46.16	6.72	...	6.57	7.35	11.81	7.02	6.69	7.81
Detroit	6.57	7.57	8.56	43.50	6.90	7.36	6.79	7.54	11.95	7.16	6.80	7.83
Erie, Pa.	6.35	7.38	8.30	....	6.70	...	6.50	7.45¶	....	6.69	6.52	7.64
Houston	7.35	7.80	9.93	....	7.70	9.30	7.70	9.50	....	7.60	7.35	8.75
Los Angeles	7.50	9.35	9.95	50.15	7.85	11.75	7.45	10.15	13.15	7.65	7.45	9.55
Milwaukee	6.47	7.47	8.39	....	6.71	...	6.60	7.44	11.84	6.86	6.61	7.73
Moline, Ill.	6.72	7.72	8.65	....	6.97	...	6.86	7.60	....	7.04	6.87	...
New York	6.97	7.91	8.79	44.95	7.54	...	7.37	8.73¶	12.13	7.35	7.27	8.65
Norfolk, Va.	7.00	...	...	....	7.10	...	7.10	8.60	....	7.10	7.10	7.95
Philadelphia	6.19	7.44	8.26	41.93§	6.96	8.80	6.74	7.86§	11.96	6.54	6.49	7.51**
Pittsburgh	6.38	7.38	8.30	46.00	6.72	...	6.51	7.85	11.75	6.69	6.52	7.64
Portland, Oreg.	7.00	7.75	8.90	48.50	7.25	...	7.05	10.20	14.00	7.00	6.85	8.75
Richmond, Va.	6.43	7.39	8.67	....	6.77	...	6.71	8.33	....	7.08	6.65	8.05
St. Louis	6.67	7.67	8.59	43.89	6.91	...	6.80	7.64¶	12.04	7.09	6.81	7.93
St. Paul	7.04	8.04	8.96	....	7.28	...	7.17	8.01	....	7.35	7.18	8.30
San Francisco	7.55	8.95	8.70	51.65	7.80	...	7.35	10.05	13.05	7.50	7.40	9.45
Seattle	8.10	9.80	10.15	51.00	8.20	...	7.80	10.95	13.50	7.75	7.80	9.60
Spokane	8.35	9.65†	10.05	....	7.80	...	7.80	10.85‖‖	14.25	7.65	7.55	9.60
Washington	6.70	7.99	7.97	....	7.37	...	7.38	9.09	....	7.31	7.05	8.16

*Prices do not include gage extras; †prices include gage and coating extras, based on 11-cent zinc except in New York, Philadelphia, Los Angeles, Cincinnati, Cleveland, Pittsburgh, San Francisco (11.50-cent zinc) and in Birmingham (coating extra excluded); ‡includes 35-cent special bar quality extra; §as rolled; **½-in. and heavier; ††as annealed; ‡‡prices include $3 for crating; §§under ½-in.

Base quantities, 2000 to 4999 lb except as noted: Cold-rolled strip and cold-finished bars, 2000 lb and over except in Seattle, 2000 to 9999 lb; stainless sheets, 5000 lb except in New York and Boston, 10,000 lb, and in San Francisco, 2000 to 4999 lb; hot-rolled products on West Coast, 2000 to 9999 lb; †—500 to 9999 lb; ‡—4000 lb and over; §—1000 to 1999 lb; ‖—1000 lb and over; ¶—1500 to 3999 lb; #—2000 to 3999 lb; ¤—f.o.b. local delivery in lots of 10,000 lb and over.

U. S. Vulcanite work wheel brings new quality to centerless grinding

This non-porous rubber bonded type wheel will

A Produce superior high finishes (8 down to 4 Micro) on final passes.

B Deliver more pieces per wheel—for greater economy. (Specify A80-R2-R8)

C Resist the dressing action of sharp projections that have a small area of contact. (Specify A80-T3-R8)

These U. S. VULCANITE WORK WHEELS have done the above jobs for many manufacturers—and will provide you with better grinding quality and *reduce your costs.*

EXTRA DIVIDEND: Remember that when you buy wheels from a United States Rubber Company salesman you are dealing *direct* and are being served by a specialist—a man whose only job is selling and *servicing* abrasive wheels. He will see that you get maximum value out of your abrasive wheel dollars.

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"U. S." Production builds it . . .
U. S. Industry depends on it

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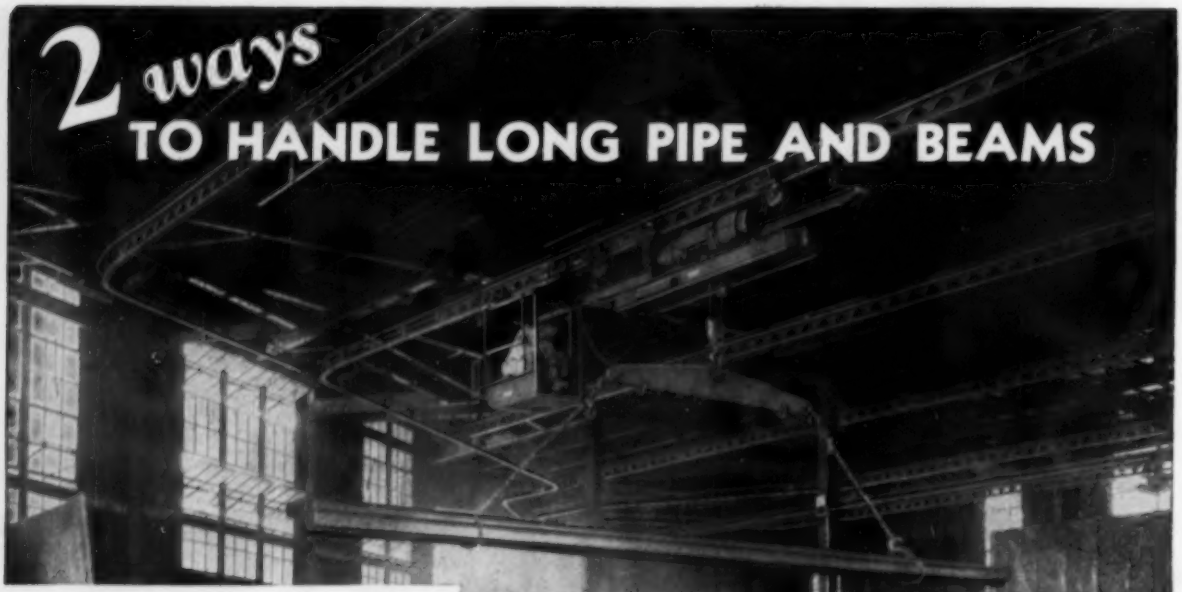
Molded and Extruded Rubber and Plastic Products • Protective Linings and Coatings • Conductive Rubber • Adhesives • Roll Coverings • Mats and Matting

2 ways TO HANDLE LONG PIPE AND BEAMS

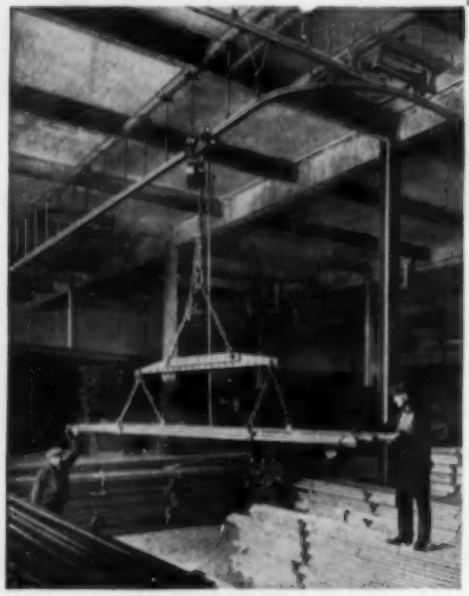


ELECTRICALLY OPERATED TRAMRAIL SYSTEM

Above: This cab-controlled system is equipped with motor-driven hoist and carrier for fast, efficient operation.

MANUALLY OPERATED TRAMRAIL SYSTEM

Below: This simple inexpensive system will save much time and soon pay for itself. Both hoist and carrier are hand operated.



Long pipe, beams and metal stock are heavy and awkward to handle by hand or on floor conveyances. It is difficult to haul them through narrow shop aisles and around corners. In many instances it is necessary to reload onto different types of conveyances in order to overcome floor obstacles and reach the ultimate delivery point.

Cleveland Tramrail materials handling equipment simplifies the transportation of unwieldy materials within or between plants, because it operates overhead above and away from floor obstacles and traffic. It hoists and delivers the materials direct from point to point without in-between handling. Illustrated are two types of overhead materials handling systems for conveying lengthy items. Other manually or electrically operated equipment is built to suit individual requirements.

Now is the time to consider methods of improving plant efficiency. A discussion with your local Cleveland Tramrail engineer may start you on the way to greater production, lower costs, improved safety and other advantages possible with a good overhead system properly engineered.

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CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

Because of a steep rise in shipments abroad . . .

New Restrictions Go On Scrap

BUSINESS is good all over. Steel scrap exports show that.

In the first two months of this year almost half as much steel scrap was exported from the U. S. as in all of 1954, the biggest year since 1940 (see accompanying chart).

This accelerating pace is a problem to Washington policymakers. They have to decide what kind of an export policy we're going to have.

New Restrictions—Acuteness of the situation prompted the Bureau of Foreign Commerce, U. S. Department of Commerce, last week to announce new conditions under which iron and steel scrap exports will be licensed until further notice.

Effective Mar. 7 an exporter holding outstanding export licenses may apply for additional licenses on a cargo-for-cargo basis against shipments he made from the U. S. on or after Feb. 21, 1955. Each application must be accompanied by a copy of the onboard bill of lading bearing the number of the export license covering the shipment.

How To Qualify—An applicant who does not hold an outstanding export license for iron and steel scrap may submit an application to export a quantity not to exceed a maximum cargo lot on a single carrier.

Export licenses issued under these procedures will bear this notation: "This license is valid for a single shipment of material on a single carrier only."

Export license applications now on file, which cannot be acted upon under present procedures, will be returned without action.

Exemptions—The new limitations do not apply to shipments of offshore scrap or to shipments to Mexico from the continental U. S. Exports to Canada also are not affected since they do not require individual export licenses.

The steel mills, users of scrap, want scrap exports restricted. Scrap brokers, sellers of scrap, want few or no restrictions. So does the U. S. State department.

Scrap exports in January and February of this year were approximately 267,500 gross tons each, making a total of 535,000 gross tons. In all of 1954, exports were 1,353,264 gross tons, largest amount since 1940's 2,814,698 gross tons.

Recommended—As a result of the sharp increase this year, the Business & Defense Services Administration Task Group on Iron & Steel Scrap Exports recommended to the Commerce department that a qualitative control be placed on steel scrap exports for the second quarter. It proposed that all second-quarter shipments of steel scrap contain a 30 per cent minimum of No. 2 bundles and 30 per cent maximum of No. 1 grade steel scrap.

In Opposition—Steelmakers oppose exportations of scrap with the contention that our reservoir of metallics is weakened. They also feel that exports push the domestic price up. The scrap industry contends that it isn't able to sell all its material to the United States steel industry and that foreign markets are needed to take the excess. The scrap industry also asserts that limitations on scrap exports are discriminatory. The scrap people point out that the steel industry can ship pig iron, iron ore, carbon and low-alloy steel products without a license.

The U. S. State department opposes quantity control of scrap exports. It wants us to follow a good-neighbor policy of exporting scrap as freely as we can without seriously draining our supplies.

Cause of Demand—Foreign countries want our scrap. Their steel business is good—just like ours. In January, the European Coal & Steel Community produced steel at an annual rate of 50 million metric tons, 6 million tons above the previous record of 43,800,000 tons. Getting enough scrap is one of their top problems.

The BDSA Task Group's plan for limits on scrap exports from the United States may hurt the foreign countries, the group was told. All European mills cannot use or do not want as much No. 2 bundle material as they would have to take under the group's proposal.

Scrap . . .

Scrap Prices, Page 188

Cleveland—Prices are strong on steelmaking grades in this market although buying is restricted. Steel grades are quoted about $1 per ton higher, as are a number of cast iron grades. Blast furnace material is also up $1. Expectations are the market will peak within the next 60 days. Dealers are making every effort to move tonnage from their yards as quickly as possible.

Buffalo—Strength swept through the local scrap market last week as the district's leading mill buyer placed orders for approximately 15,000 tons of No. 2 heavy melting steel, bundles and short shovel turnings at prices $1.50 above those recently prevailing. Stronger tendencies in other markets and the high ingot rate here

(*Please turn to page* 159)

How about Malleable ?

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Strength	Excellent Machinability
Toughness and Ductility	High Impact Resistance
Rust and Corrosion Resistance	Versatile Castability

• Malleable iron is a cast ferrous alloy heat-treated to provide a remarkable combination of properties. Malleable castings are both strong and tough—flow under excessive compressive and transverse loads, seldom fracture.

• Malleable castings machine easier than any other ferrous material of comparable strength and toughness.

• Malleable iron can be cast into intricate shapes close to final form, greatly reducing machining costs and eliminating complicated and costly assemblies.

• Malleable castings are highly resistant to atmospheric corrosion and are widely used for products used outdoors.

• Modern foundry methods and careful scientific casting control assure you of uniformly high quality castings for better products.

For complete specifications and tolerances for both standard and pearlitic malleable castings, write to the Malleable Founders' Society.

Malleable FOUNDERS' SOCIETY

1800 Union Commerce Building Cleveland 14, Ohio

Steel Bars . . .

Bar Prices, Page 142

The demand for carbon and alloy bars rises slowly. As a result, mills are building modest backlogs and shipment promises are being extended. At Philadelphia, hot-rolled carbon deliveries average five to six weeks in some instances, cold-finished carbon even longer. The tightening in mill schedules, in fact, is developing too fast for some consumers who are turning to the warehouses for help in piecing out immediate needs. Some seek to place mill-size orders with distributors, but, generally, such business is being turned away since the jobbers do not care to have their stocks "raided." Demand is diversified with defense requirements little changed from that of recent months. On the West Coast, volume is reported up 10 per cent, some of the increase stemming from defense business. New England sellers report slight improvement in buying by forge shops and screw machine products makers. Converters are buying ahead, but in general, inventories are being watched closely, even by the warehouses.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 143 & 144

Strong uptrend in sheet buying continues. Not only is consumption stepping up but there is a growing disposition to build inventories, somewhere in the range of 60 to 90 days as against 45 days in the immediate past.

Little cold-rolled tonnage is available before June. Even hot-rolled sheets are harder to get, with deliveries extending into May. In galvanized, some producers are virtually out of the market for the entire second quarter.

Enameling stock and electrical deliveries are well extended. Electrical sheets for large transformers and generators are being allocated. Medium and light silicon grades for fractional horsepower motors are available for late May. Sellers of enameling stock and most producers of continuous galvanized sheets are sold out for the remainder of the half. Armco Steel Corp. will discontinue production of galvanized sheets at Butler, Pa., Apr. 1 to devote facilities there regularly to aluminized sheets.

Beyond June, producers anticipate only a moderate decline in demand. Automakers' needs will be down whether there is a strike or not. However, requirements of air-conditioner interests, appliance makers and

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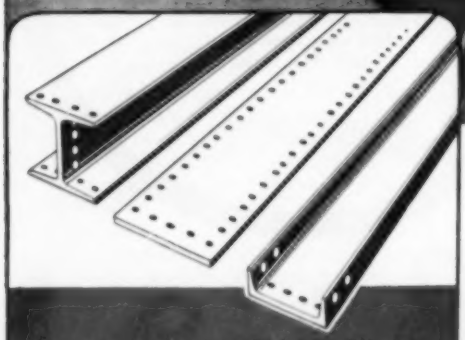

This new Spacing Table-Beam Punch Combination handles beams, channels, angles and cover plates with a minimum of tool changing and maximum economy.

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designed for the smaller fabricating shop

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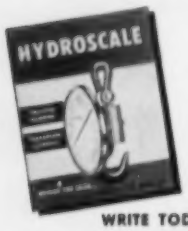

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Machine Tool BUILDERS Since 1898

others are seen providing a strong prop to the market.

Production is being pushed at virtually 100 per cent of mill capacity. Newport Steel Corp., Newport, Ky., has better than 10 weeks' backlog of orders for its new cold-reduction mill. For the fourth straight week, sheet order receipts by St. Louis district mills topped shipments.

United States Steel Export Co. has advanced its export price on galvanized sheets 15 cents to $5.82 per 100 lb, effective Mar. 2, at New York, Philadelphia and Baltimore.

Wire . . .

Wire Prices, Pages 144 & 145

Tighter supply conditions are developing in the wire market. Chicago district consumers are experiencing extending deliveries on manufacturers wire items, with producers maintaining full production schedules. Automotive activity is the chief factor, but general demand also is good. In the East, demand is better, though noticeably less strong than the Midwest. For example, Philadelphia sellers report specifications for the second quarter have got off to a slow start except for merchant products and auto spring steel. Demand for wire rods is particularly sluggish, they say. New England mills are booked heavier on spring wire and cold heading grades. In some cases consumers have covered for the entire second quarter. Wire rope volume is described as fair, but some price sniping is noted at the distributor level. Demand for fine wire is not keeping pace with that for the heavier gages. Jobbers are ordering against spring agricultural requirements. April is likely to be the best sales month in merchant products.

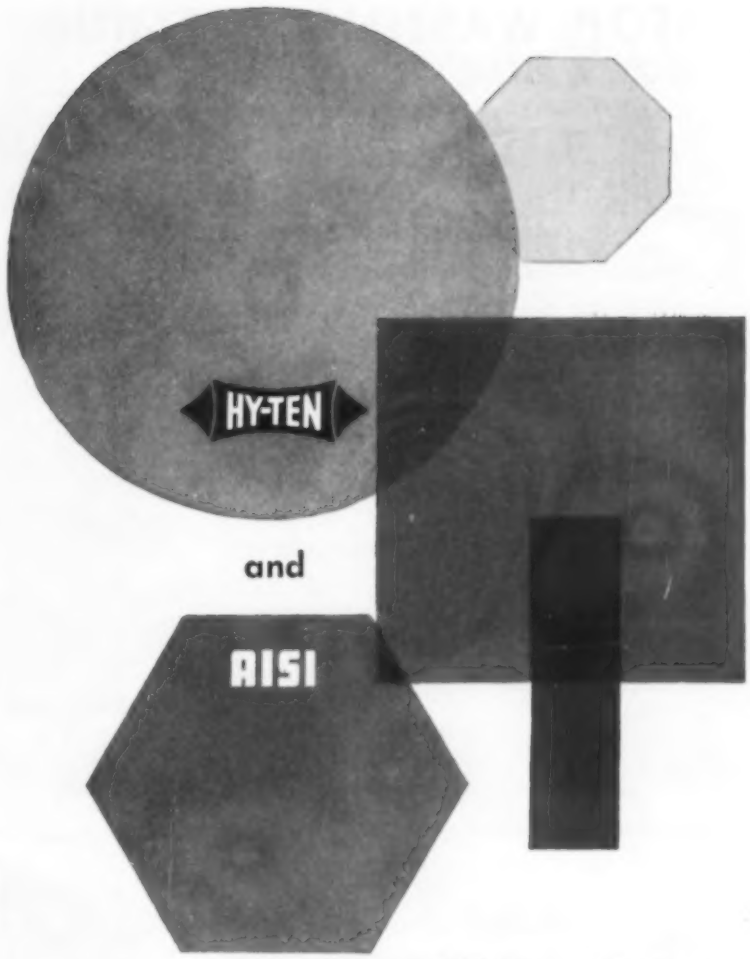
Plates . . .

Plate Prices, Page 142

Central Iron & Steel Co., Harrisburg, Pa., last week raised its prices on carbon plates $5 per ton to 4.225c, mill, and floor plates $2.50 to 5.275c, mill, effective Mar. 7. These advances bring Central's published prices in line with the general market.

Steady gains in demand are reported for both heavy and light plates. Buying for pipelines, bridges and other construction is increasing. Miscellaneous fabricators' requirements this month are larger than in February. Customers appear to have cut inventories to a dangerous level and now are rushing to build stocks.

Eastern platemakers are quoting three to four weeks delivery, in some



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the modern method of handling ferrous parts

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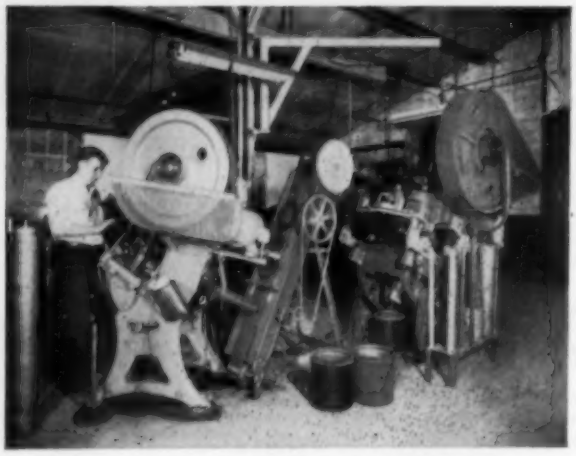

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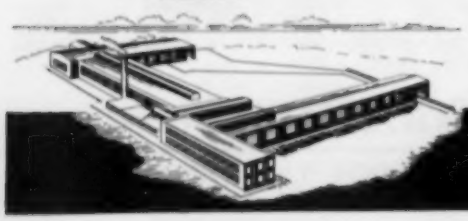

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instances longer. For instance, one producer is quoting mid-May at one plant and mid-April at another. In general, producers specializing in plates can make fairly quick shipments while those with a more diversified line, including sheets, are quoting on a more extended basis. This appears due to the fact semi-finished is being diverted in larger tonnage to production of the more profitable products.

Tool Steel . . .

Shipments of high speed and tool steel (exclusive of hollow drill steel) totaled 7822 net tons in January, reports the American Iron & Steel Institute. This is an increase, compared with shipments of 7464 tons in the preceding month, but is down slightly from the 8117 tons moved in January a year ago.

Tubular Goods . . .

Oil companies are rebuilding pipe inventories after having trimmed them earlier this year. There is a scramble on for seamless tubes for oil country use. March sales will be best this quarter by a considerable margin. Miscellaneous users of seamless generally are raising requirements.

Distributors of mechanical and pressure tubing in New England are again building inventories. For more than a year they have lived largely off stocks. Demand for merchant pipe is up slightly for March shipment. Boiler tubes and buttweld pipe, however, have lost part of what were lush markets for them. Dieselization of railroads hit tubes. Increased use of nonferrous pipe hurt buttweld.

In general, merchant pipe demand appears well sustained, and there is somewhat less shading of prices by resellers. A greater number of resellers are less disposed to cut more than 10 per cent off list. Deliveries are somewhat more extended. Seamless in the mid-sizes, under 10-in., has moved out well into April in the case of some producers.

Warehouse . . .

Warehouse Prices, Page 146

Distributors are increasing the quantities for which they will sell cold-finished bars on a parity with the mills (a range of 2000 to 3999 lb). They have revised base prices in many districts. In an effort to increase revenue on small quantities, they are establishing new extras on cold-finished bars in lots of less than 300 lb.

Warehouse steel buying is on a

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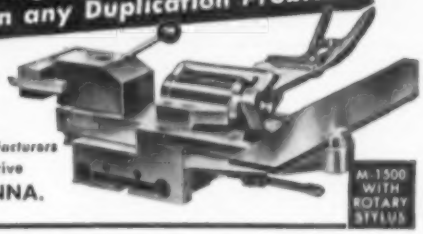

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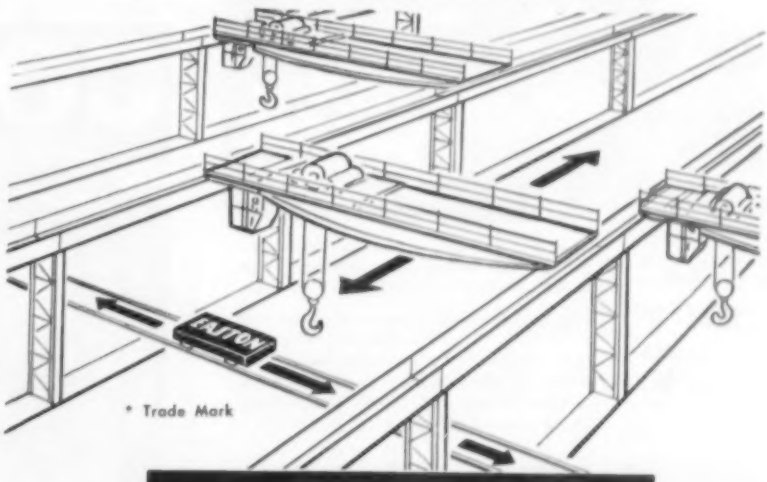

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broader base. Volume for the first three months of this year will surpass that of any recent quarter. As mill deliveries move out, distributors look for more fill-in buying by industrial consumers, as well as a seasonal pickup for construction and highway specialties.

Acquisition of Arthur C. Harvey Co., Boston, by Joseph T. Ryerson & Son Inc. puts Ryerson into aluminum distribution in that area.

Rails, Cars . . .

Track Material Prices, Page 145

The Atlantic Coast Line railroad placed an order with the Ensley (Ala.) rail mill of Tennessee Coal & Iron Division, U. S. Steel Corp., for 35,000 tons of rails valued at $3,195,000. Accessories will cost another $1 million.

The Greenville Steel Car Co., Greenville, Pa., has booked an order for 100 seventy-ton covered hopper cars for the Western Maryland railroad. Construction will begin in June.

January Steel Shipments Soar

Shipments of finished steel products in January totaled 6,009,958 net tons, reports the American Iron & Steel Institute. This was the largest tonnage moved by the mills since October, 1953. The volume compares with 5,448,649 tons shipped in December and with 5,727,600 tons moved in January a year ago.

An all-time record of 1,187,104 tons of cold-rolled sheets was shipped during January, nearly 82,000 tons more than in December. Breakdown of shipments during January is given in the accompanying table.

SHIPMENTS OF STEEL PRODUCTS—JANUARY, 1955
(All grades—carbon, alloy and stainless)
(Net tons)

Product	Carbon	Alloy	Stainless	Total
Ingots	14,578	13,749	1,949	30,276
Blooms, slabs, etc.	134,935	37,471	1,122	172,528
Skelp	6,011	.....	.....	6,011
Wire rods	82,272	2,024	536	84,832
Structurals (heavy)	332,280	3,806	9	336,095
Steel piling	21,480	.....	.....	21,480
Plates	416,969	20,480	1,269	438,718
Rails (standard)	92,439	.....	.....	92,439
Rails (all other)	4,679	.....	.....	4,679
Joint bars	3,283	.....	.....	3,283
Tie plates	15,626	.....	.....	15,626
Track spikes	4,965	.....	.....	4,965
Wheels	21,641	164	.....	21,805
Axles	7,356	2	.....	7,358
Bars (hot-rolled)	462,142	157,961	3,063	623,166
Bars (reinforcing)	115,750	.....	.....	115,750
Bars (cold-finished)	110,021	22,000	3,584	135,606
Tool steel	1,051	6,771	.....	7,822
Standard pipe	194,061	131	.....	194,192
Oil country goods	148,914	29,996	.....	178,910
Line pipe	119,377	.....	.....	119,377
Mechanical tubing	48,130	17,891	201	66,222
Pressure tubing	15,889	2,149	958	18,996
Wire—drawn	211,193	3,410	2,315	216,918
Nails & staples	49,480	.....	.....	49,480
Wire, barbed	10,855	.....	.....	10,855
Woven wire fence	29,091	.....	.....	29,091
Bale ties	2,291	.....	.....	2,291
Black plate	62,373	.....	.....	62,373
Tin & terne plate—hot dipped	82,874	.....	.....	82,874
Electrolytic tin plate	335,682	.....	.....	335,682
Sheets (hot-rolled)	700,063	31,376	2,251	733,690
Sheets (cold-rolled)	1,174,705	3,256	9,143	1,187,104
Sheets (galvanized)	210,795	306	.....	211,101
Sheets (other coated)	20,671	.....	.....	20,671
Sheets (enameling)	20,066	.....	.....	20,066
Sheets & strip (electric)	9,998	46,813	.....	56,811
Strip (hot-rolled)	155,727	1,904	457	158,088
Strip (cold-rolled)	110,261	1,085	21,282	132,628
Total January, 1955	5,559,074	402,745	48,139	6,009,958
Total January, 1954	5,361,531	327,745	38,324	5,727,600

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Ores

Lake Superior Iron Ore

(Prices effective for the 1955 shipping season; gross ton, 51.50% iron natural, rail of vessel, lower lake ports)

Old range bessemer	$10.40
Old range nonbessemer	10.25
Mesabi bessemer	10.25
Mesabi nonbessemer	10.10
Open-hearth lump	11.25
High phosphorus	10.25

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

Foundry and basic 52-62% concentrates contract	17.00-18.00

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60-68%	20.00
N. African hematite (spot)	nom. 20.00-22.00
Brazilian iron ore, 65-69% (spot)	25.00

Tungsten Ore

Net ton unit, before duty

Foreign, wolframite, good comercial quality	$25.00-$26.00
Domestic, scheelite, mine	63.00

Manganese Ore

Mn 48%, nearby, 90c-92c per long ton unit c.i.f. U. S. ports, duty for buyer's account, 46-47%, 80c.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., or Tacoma, Wash.

Indian and African

48% 2.8:1	nom. $40.00-$42.00
48% 3:1	42.00-44.00
48% no ratio	32.00-34.00

South African Transvaal

44% no ratio	$19.00-$20.00
48% no ratio	31.00-32.00

Domestic

Rail nearest seller

18% 3:1	$39.00

Molybdenum

Sulphide concentrate, per lb of Mo content, unpacked	$1.00

Antimony Ore

Per unit of Sb content, c.i.f. seaboard

50-60%	$3.25-$3.80
65%	4.15-4.25

Vanadium Ore

Cents per lb. V_2O_5 content, deld. mills

Domestic	31.00

Refractories

Fire Clay Brick (per 1000)

High-Heat Duty: Pueblo, Colo., $94; Ashland, Grahn, Hayward, Hitchins, Haideman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parral, Portsmouth, O., Ottawa, Ill., Stevens Pottery, Ga., $114; Salina, Pa., $119; Niles, O., $125; Los Angeles, Pittsburg, Calif., $137.20.

Silica Brick (per 1000)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Portsmouth, O., $120; Warren, Niles, O., Hays, Pa., $125; Morrisville, Pa., $123.50; E. Chicago, Ind., Joliet, Rockdale, Ill., $130; Cutler, Utah, $121.55; Los Angeles, $127.85.

Super Duty: Hays, Sproul, Pa., Warren, Windham, O., Athens, Tex., $137; Morrisville, Pa., Niles, O., $140; Joliet, Ill., $143.

Semisilica Brick (per 1000)

Clearfield, Pa., $130; Woodbridge, N. J., $114.

Insulating Fire Brick (per 1000)

2300° *F:* Massillon, O., $178.50; Clearfield, Pa., $213; Augusta, Ga., Beaver Falls, Zelienople, Pa., Mexico, Mo., $206; Vandalia, Mo., $214.10; Portsmouth, O., $207.50; Bessemer, Ala., $212.80.

Ladle Brick (per 1000)

Dry Pressed: Bessemer, Ala., $64.60; Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Mexico, Mo., $77.50; Wellsville, O., $81.50; Clearfield, Pa., Portsmouth, O., $87; Peria, Ark., $109; Los Angeles $110.25; Pittsburg, Calif., $111.30.

High-Alumina Brick (per 1000)

50 *Per Cent:* Clearfield, Pa., St. Louis, Mexico, Mo., $181; Danville, Ill., $189.30.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., Clearfield, Pa., $225; Danville, Ill., $213.20.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $260; Danville, Ill., $258; Clearfield, Pa., $267.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., $147; Clearfield, Pa., $148.50; St. Louis, $159.30; Athens, Tex., $155.

Nozzles (per 1000)

Reesdale, Pa., $234.70; Johnstown, Pa., $240.70; Clearfield, Pa., $241.40; St. Louis, $259.45; Athens, Tex., $247.70; Bridgeburg, Pa., $267.50.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., $183.50; Clearfield, Pa., $185.50; St. Louis, $195.80; Athens, Tex., $191.80.

Dolomite (per net ton)

Domestic, dead-burned, bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Nario, Gibsonburg, Woodville, O., $14.50; Thornton, McCook, Ill., $15.10; Dolly Siding, Bonne Terre, Mo., $13.65.

Magnesite (per net ton)

Domestic, dead-burned bulk, ¼-in. grains with fines: Luning, Nev., Chewelah, Wash., $38.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, furnace	$13.50-$14.00
Connellsville, foundry	16.50-17.00

Oven Foundry Coke

Kearny, N. J., ovens	$24.00
Everett, Mass., ovens	
New England, deld.	*26.05
Chicago, ovens	24.50
Chicago, deld.	26.00
Terre Haute, Ind., ovens	24.05
Milwaukee, ovens	25.25
Indianapolis, ovens	24.25
Cincinnati, deld.	25.85
Painesville, O., ovens	25.50
Cleveland, deld.	27.43
Erie, Pa., ovens	25.00
Birmingham, ovens	22.65
Cincinnati, deld.	27.58
Buffalo, ovens	25.00
Buffalo, deld.	26.25
Lone Star, Tex., ovens	18.50
Philadelphia, ovens	23.00
Swedeland, Pa., ovens	23.00
St. Louis, ovens	
St. Louis, deld.	26.00
St. Paul, ovens	23.75
Portsmouth, O., ovens	24.00
Cincinnati, O., deld.	26.62
Detroit, ovens	25.50
Detroit, deld.	26.50
Pontiac, deld.	27.06
Saginaw, deld.	28.58

*Or within $4.55 freight zone from works.

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Spot, cents per gallon, ovens

Pure benzol	36.00
Toluol, one deg.	32.00-35.00
Industrial xylol	32.00-35.00

Per ton, bulk, ovens

Sulphate of ammonia	†42-$46
Birmingham area	42.00†

†With port equalization against imports.

Cents per pound, producing point

Phenol, 40 deg. (U.S.P.), tank cars	18.00
c.l. drums	19.00
l.c.l. drums	19.50

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Metallurgical grades, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $35-$36; 70%, $32-$33; 60%, $28-$29. Imported, net tons, duty paid, metallurgical grade: European, $28-$30; Mexican, $25.50.

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Inches Diam	Length	Per 100 lb
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2½	30	30.75
3	40	30.00
4	40	28.50
5⅛	40	28.25
6	60	25.50
7	60	25.25
8, 9, 10	60	22.75
12	72	26.00
14	60	22.50
16	72	21.50
17	60	22.00
18	72	21.50
20	72	21.25
CARBON		
8	60	11.40
14, 12, 10	60	11.10
14	72	10.25
17	60	10.25
17	72	9.85
20	84	9.85
20	90	9.65
24	72, 84	9.85
24	96	9.60
30	84	9.75
40, 35	110	9.50
40	100	9.50

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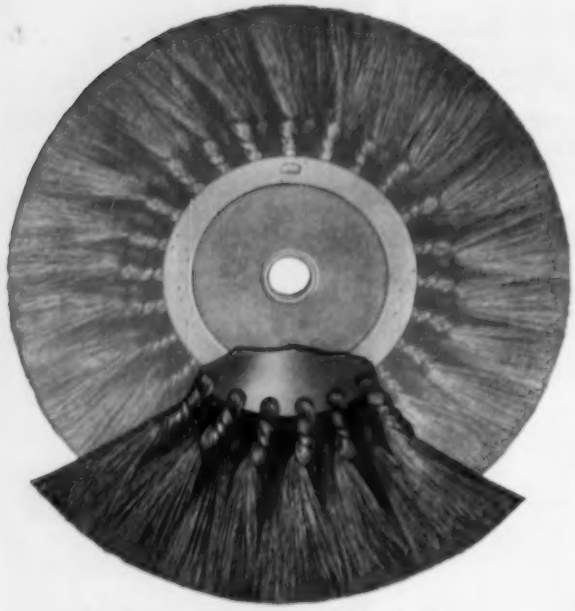

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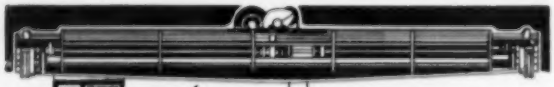

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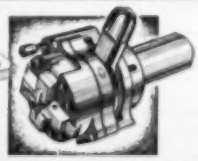

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Scrap . . .

(*Concluded from page* 149)

are major factors for the improved sentiment.

Boston—Steel scrap prices tend to harden, with top grade No. 1 heavy melting for central Massachusetts delivery bringing $31, shipping point. For eastern Pennsylvania delivery, $29-$29.50 is paid. No. 2 bundles are slightly more active and reflect this in stronger prices. For export, No. 1 steel is up $1, dock, to $32, with No. 2 quoted at $27-$28.

Philadelphia—While prices on most major grades of steel scrap are unchanged, the market continues strong. Mixed borings and turnings are holding at $21-$21.50, delivered, and heavy turnings are $34-$35. Rail crops are higher at $52-$53, delivered. No. 1 cupola cast also is higher at $38.

Pittsburgh—Last week's activity was mainly devoted to the filing of old orders. No price changes were reported, but there's a scarcity of good scrap in this area, and mills will pay more for choice lots.

New York—Scrap brokers have advanced prices on No. 1 cupola cast $1 per ton to $30-$31. All other grades are unchanged.

Chicago—Except for No. 1 factory bundles, which command $37 per ton, up $1, steelmaking grades of scrap remain pegged at prices which have prevailed for several weeks. With the steelmaking rate inching up to the highest level in 15 months at 94 to 95 per cent of capacity, there is much speculation concerning higher prices.

The Chicago Mercantile Exchange announced that No. 1 heavy melting scrap contracts for January and March were liquidated successfully. The board of governors intends to continue trading in the commodity. Changes in the contract, however, are under study.

Cincinnati—Fair demand for turnings and borings has developed. The price of machine shop turnings has moved up 50 cents a ton to $17.50-$18.50. Open-hearth grades have run into a price battle between the local mill and brokers. The mill is offering $34 for No. 1 steel and $25 for No. 2 bundles. So far, however, these prices have not attracted any tonnage.

St. Louis—The scrap market is inactive here. Local melters hold large ground stocks and are placing no more than routine orders.

Los Angeles—The undertone of the scrap market is firm. Purchases, however, are off slightly from those of a month ago for most dealers.

San Francisco—Steel scrap prices have advanced, reflecting heavy export demand. Current quotations are $2 to $5 per ton above those previously in effect. District mills are not taking any material at present.

Seattle—Scrap prices are firm on the basis of the $2 increase effected a week ago. Current quotations are $31 and $27, respectively, for No. 1 and No. 2 heavy melting steel. The higher price levels are being maintained despite nominal consumption and high mill inventories. Export activity is the main factor for strength.

Washington—Consumption of ferrous materials (scrap and pig iron) increased in January, reflecting a 7 per cent increase in steel production during the month, reports the Bureau of Mines. The total metallics melt was 10,638 000 gross tons, of which 50.9 per cent was scrap and 49.1 per cent pig iron.

Scrap consumption totaled 5,432,000 tons, 2 per cent less than in December. Home scrap accounted for 3,034,000 tons, purchased scrap, 2,398,000 tons.

Stocks of ferrous scrap held by consumers at the end of January amounted to 6,502,000 gross tons, a slight decrease from December.

Tin Plate . . .

Tin Plate Prices, Page 144

Current mill base prices on tin plate (electrolytic and hot-dipped), terne plate and black plate are being extended for the pricing period of from Apr. 1 to Sept. 30. The U. S. Steel Corp. last week announced it was taking this action along with its general operating divisions, Columbia-Geneva Steel and Tennessee Coal & Iron. Other producers of tin plate and tin mills products are expected to announce similar policy. For the current schedule of prices see p. 144.

(*Please turn to page* 162)

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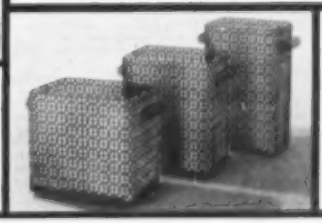

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Perforated Metal • Perforated Metal Screens • Wedge-Slot Screens • Architectural Grilles • Mitco Open Steel Flooring • Shur-Site Treads • Armorgrids

Iron and Steel Scrap

Consumer prices, per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL. Changes shown in Italics.

STEELMAKING SCRAP COMPOSITE

Mar. 9	$37.33
Mar. 2	37.33
Feb. Avg.	36.79
Mar. 1954	24.37
Mar. 1950	28.23

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

(Delivered consumer plant)

No. 1 heavy melting..	38.00-39.00
No. 2 heavy melting..	35.00-36.00
No. 1 bundles	38.00-39.00
No. 2 bundles	39.50-30.50
No. 1 busheling	38.00-39.00
Machine shop turnings.	20.50-21.50
Mixed borings, turnings	20.50-21.50
Short shovel turnings..	24.50-25.50
Cast iron borings	24.50-25.50
Cut structurals, 5 ft lengths	41.00-42.00
Heavy turnings	34.00-35.00
Punchings & plate scrap	42.00-43.00
Electric furnace bundles	39.00-40.00

Cast Iron Grades

No. 1 cupola	38.00-39.00
Charging box cast	32.00-33.00
Heavy breakable cast..	32.00-33.00
Unstripped motor blocks	22.00-23.00
No. 1 machinery cast..	43.00-44.00

Railroad Scrap

No. 1 R.R. heavy melt..	40.00-41.00
Rails, 2-ft and under..	50.00-51.00
Rails, 18-in. and under.	51.00-52.00
Rails, random lengths..	46.00-47.00
Railroad specialties	44.50-45.50

Stainless Steel Scrap

18-8 bundles & solids	210.00-220.00
18-8 turnings	105.00-110.00
430 bundles & solids	95.00-100.00
430 turnings	60.00-65.00

CLEVELAND

(Delivered consumer plant)

No. 1 heavy melting	*35.00-36.00*
No. 2 heavy melting	*31.00-32.00*
No. 1 bundles	*35.00-36.00*
No. 2 bundles	*28.00-29.00*
No. 1 busheling	*35.00-36.00*
Machine shop turnings.	17.00-18.00
Mixed borings, turnings	*24.00-25.00*
Short shovel turnings	*24.00-25.00*
Cast iron borings	*24.00-25.00*
Low phos.	*35.00-36.00*
Cut structural plate 2 ft and under	*39.50-40.50*
Alloy free, short shovel turnings	*26.50-27.50*
Electric furnace bundles	*35.00-36.00*

Cast Iron Grades

No. 1 cupola	45.00-46.00
Charging box cast	*37.00-38.00*
Stove plate	42.00-43.00
Heavy breakable cast..	34.00-35.00
Unstripped motor blocks	29.00-30.00
Brake shoes	*32.00-33.00*
Clean auto cast	46.00-47.00
No. 1 wheels	43.00-44.00
Burnt cast	*33.00-34.00*
Drop broken machinery	46.00-47.00

Railroad Scrap

No. 1 R.R. heavy melt.	*37.00-38.00*
R.R. malleable	*45.00-46.00*
Rails, 2-ft and under.	50.00-51.00
Rails, 18-in. and under	51.00-52.00
Rails, random lengths.	45.00-46.00
Cast steel	*39.00-40.00*
Railroad specialties	*39.00-40.00*
Uncut tires	*41.00-42.00*
Angles, splice bars	*46.00-47.00*
Rails, rerolling	52.00-53.00

Stainless Steel

(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	190.00-200.00
18-8 turnings	80.00-90.00
430 clips, bundles, solids	80.00
430 turnings	40.00-50.00

YOUNGSTOWN

(Delivered consumer plant)

No. 1 heavy melting..	37.00-38.00
No. 2 heavy melting..	32.00-33.00
No. 1 bundles	36.00-37.00
No. 2 bundles	27.50-28.50
No. 1 busheling	36.00-37.00
Machine shop turnings	18.00-19.00
Short shovel turnings	*25.00-26.00*
Cast iron borings	*25.00-26.00*
Low phos.	*37.00-38.00*
Electric furnace bundles	36.00-37.00

Railroad Scrap

No. 1 R.R. heavy melt.	*38.00-39.00*

CHICAGO

No. 1 heavy melting..	33.00-35.00
No. 2 heavy melting..	31.00-32.00
No. 1 factory bundles	*27.00*
No. 1 dealer bundles..	33.00-34.00
No. 2 bundles	24.00-25.00
No. 1 busheling	33.00-35.00
Machine shop turnings	16.00-17.00
Mixed borings, turnings	18.00-19.00
Short shovel turnings..	18.00-19.00
Cast iron borings	18.00-19.00
Cut structurals, 3 ft	35.00-36.00
Punchings & plate scrap	36.00-37.00
Electric furnace bundles	35.00-36.00

Cast Iron Grades

No. 1 cupola	39.00-41.00
Stove plate	34.00-35.00
Unstripped motor blocks	28.00-29.00
Clean auto cast	44.00-45.00
Drop broken machinery	44.00-45.00

Railroad Scrap

No. 1 R.R. heavy melt.	36.00-37.00
R.R. malleable	44.00-45.00
Rails, 2-ft and under..	47.00-48.00
Rails, 18-in. and under	48.00-49.00
Angles, splice bars	43.00-44.00
Rails, rerolling	49.00-50.00

Stainless Steel Scrap

18-8 bundles & solids	205.00-210.00
18-8 turnings	95.00-100.00
430 bundles & solids	85.00-90.00
430 turnings	45.00-50.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	28.50
No. 2 heavy melting	22.00
No. 1 bundles	29.00
No. 2 bundles	21.00
No. 1 busheling	28.00
Machine shop turnings	13.00
Mixed borings, turnings	13.00
Short shovel turnings..	17.00
Punchings & plate scrap	30.00

Cast Iron Grades

Charging box cast	37.00
No. 1 cupola	34.00
Stove plate	30.00
Heavy breakable	25.00
Unstripped motor blocks	20.00
Clean auto cast	38.00
Malleable	40.00

BIRMINGHAM

No. 1 heavy melting..	30.00-31.00
No. 2 heavy melting..	27.00-28.00
No. 1 bundles	30.00-31.00
No. 2 bundles	23.00-24.00
No. 1 busheling	30.00-31.00
Cast iron borings	15.00-16.00
Short shovel turnings	21.00-22.00
Machine shop turnings	17.00-18.00
Electric furnace bundles	32.00-33.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	45.00-46.00
Stove plate	42.00-43.00
Bar crops and plate	36.00-37.00
Structural plate, 2 ft	36.00-37.00
Unstripped motor blocks	35.50-36.50

Railroad Scrap

No. 1 R.R. heavy melt.	35.00-36.00
Rails, 18-in. and under	42.00-43.00
Rails, rerolling	43.00-44.00
Rails, random lengths.	38.00-39.00
Angles, splice bars	39.00-40.00
Stand. steel axles	39.00-36.00

PHILADELPHIA

(Delivered consumer plant)

No. 1 heavy melting	39.50
No. 2 heavy melting	35.00
No. 1 bundles	39.50
No. 2 bundles	31.50
No. 1 busheling	39.50
Electric furnace bundles	41.00
Machine shop turnings.	22.50
Mixed borings, turnings	*21.00-21.50*
Short shovel turnings..	25.50
Structurals & plate	42.00-43.00
Heavy turnings	*34.00-35.00*
Couplers, springs, wheels	42.50
Rail crops, 2 ft & under	*52.00-53.00*

Cast Iron Grades

No. 1 cupola	*38.00*
Malleable	44.00
Heavy breakable cast..	38.50-39.00
Drop broken machinery	44.00

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	33.00-34.00
No. 2 heavy melting	30.00-31.00
No. 1 bundles	33.00-34.00
No. 2 bundles	24.00-25.00
Machine shop turnings.	14.00-15.00
Mixed borings, short turnings	15.00-16.00
Short shovel turnings	16.00-17.00
Low phos. (structural & plate)	35.00-36.00

Cast Iron Grades

No. 1 cupola	*30.00-31.00*
Unstripped motor blocks	22.00-23.00

Stainless Steel

18-8 sheets, clips, solids	175.00-180.00
18-8 borings, turnings	85.00-90.00
430 sheets, clips, solids	60.00-65.00
410 sheets, clips, solids	50.00-55.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*29.50-30.00*
No. 2 heavy melting	*25.50-26.00*
No. 1 bundles	*29.50-30.00*
No. 2 bundles	*22.00-23.00*
Machine shop turnings	*12.50-13.00*
Mixed borings, turnings	*14.00-14.50*
Mixed shop turnings..	11.00-12.00
Short shovel turnings	*15.50-16.00*
No. 1 cast	30.00-31.00
Mixed cupola cast	28.00-29.00
No. 1 machinery cast..	33.00-34.00

BUFFALO

No. 1 heavy melting	32.00-33.00
No. 2 heavy melting	*29.00-30.00*
No. 1 bundles	32.00-33.00
No. 2 bundles	*27.00-28.00*
No. 1 busheling	32.00-33.00
Machine shop turnings	*20.50-21.50*
Short shovel turnings	*23.00-24.00*
Cast iron borings	*22.00-23.00*
Low phos.	*36.00-37.00*

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	36.00-37.00
No. 1 machinery	41.00-42.00

Railroad Scrap

Rails, random lengths..	35.00-36.00
Rails, 3 ft and under..	42.00-43.00
Railroad specialties	36.50-37.50

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting..	32.00-33.00
No. 2 heavy melting..	28.00-29.00
No. 1 bundles	32.00-33.00
No. 2 bundles	23.00-24.00
No. 1 busheling	32.00-33.00
Machine shop turnings	*17.50-18.50*
Mixed borings, turnings	19.00-20.50
Short shovel turnings.	20.00-21.00
Cast iron borings	19.50-20.50
Low phos. 18-in.	38.00-39.00

Cast Iron Grades

No. 1 cupola	39.00-40.00
Heavy breakable cast..	35.00
Charging box cast	36.00
Drop broken machinery	44.00-45.00

Railroad Scrap

No. 1 R.R. heavy melt.	35.00-36.00
Rails, 18-in. and under	47.00-48.00
Rails, random lengths..	41.50-42.50

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting..	31.00
No. 2 heavy melting..	29.00
No. 1 bundles	31.00
No. 2 bundles	24.50
Machine shop turnings	15.00
Short shovel turnings..	17.00

Cast Iron Grades

No. 1 cupola	40.00
Charging box cast	32.50
Heavy breakable cast..	32.50
Unstripped motor blocks	32.50
Brake shoes	32.00
Clean auto cast	42.50
Stove plate	36.50

Railroad Scrap

No. 1 R.R. heavy melt.	35.50
Rails, 18-in. and under	46.00
Rails, random lengths..	40.00-41.00
Rails, rerolling	46.00
Angles, splice bars	41.00

SEATTLE

(Delivered consumer plant)

No. 1 heavy melting..	31.00
No. 2 heavy melting..	27.00
No. 1 bundles	22.50
No. 2 bundles	20.00
No. 3 bundles	14.00
Machine shop turnings.	12.00-14.00
Mixed borings, turnings	12.00-14.00
Short shovel turnings..	13.00-14.00
Electric furnace, No. 1.	35.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	35.00-38.00
Heavy breakable cast..	23.00
Unstripped motor blocks	27.00
No. 1 wheels	21.00
Stove plate (f.o.b. plant)	28.00-29.00
Brake shoes	28.00-29.00

Railroad Scrap (Delivered consumer plant)

Rails, random lengths..	30.00-34.00

LOS ANGELES

No. 1 heavy melting..	28.00
No. 2 heavy melting..	24.00
No. 1 bundles	27.00
No. 2 bundles	22.00
Machine shop turnings.	8.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	42.00-44.00

SAN FRANCISCO

No. 1 heavy melting	*27.00*
No. 2 heavy melting	*25.00*
No. 1 bundles	*26.00*
No. 2 bundles	*22.00*
No. 1 busheling	*27.00*
Machine shop turnings	*8.00*
Mixed borings, turnings	*8.00*
Short shovel turnings.	9.00
Cast iron borings	9.00
Cut structurals	*27.00*
Heavy turnings	9.00
Punchings & plate scrap	*27.00*
Electric furnace bundles	19.00

Cast Iron Grades

No. 1 cupola	40.00
Charging box cast	35.00
Stove plate	37.00
Heavy breakable cast..	36.00
Unstripped motor blocks	30.00
Brake shoes	35.00
Clean auto cast	39.00
No. 1 wheels	39.00
Burnt cast	23.00
Drop broken machinery	48.00

HAMILTON, ONT.

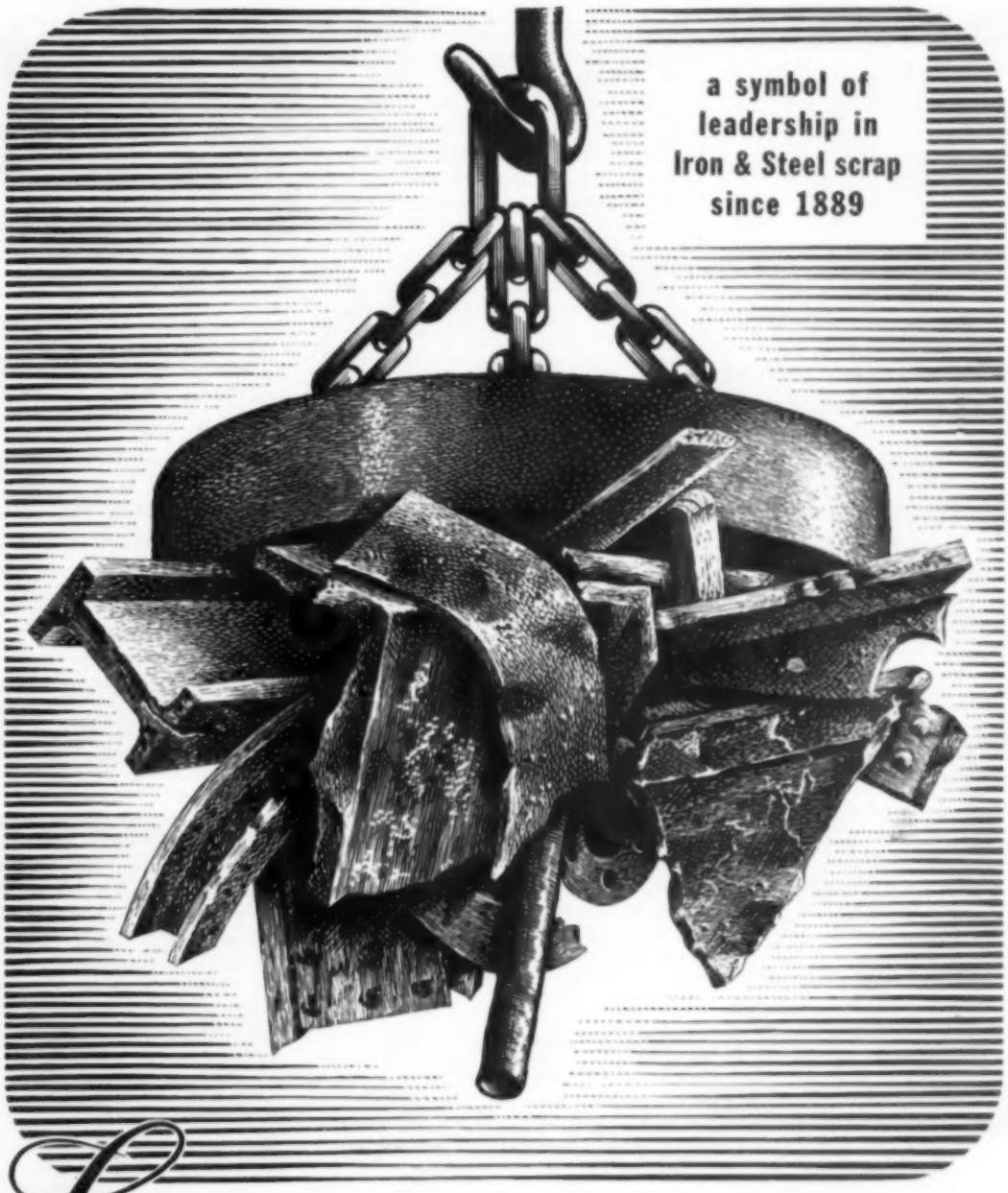
(Delivered prices)

No. 1 heavy melting...	32.00
No. 2 heavy melting...	29.00
No. 1 bundles	32.00
No. 2 bundles	26.00
Mixed steel scrap	26.00
Mixed borings, turnings	12.00
Rails, remelting	41.00
Busheling, new factory:	
Prepared	30.00
Unprepared	26.00
Short steel turnings	12.00

Cast Iron Grades†

No. 1 machinery cast..	42.00-45.00

†F.o.b., shipping point.



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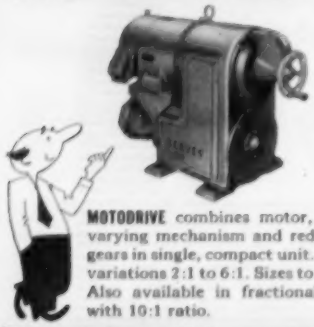

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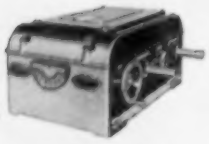

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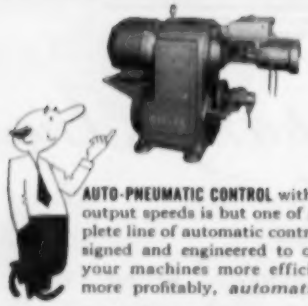

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(*Concluded from page* 159)

Most recent increase in tin plate occurred last fall for the Oct. 1, 1954, to Mar. 31, 1955, period.

Pig Iron . . .

Pig Iron Prices, Page 146

Ordering of pig iron for March use continues to increase; prospects for April appear still better. Trading is generally disappointing to sellers and reflects sluggish operations at foundries, most of which have built up inventories from year-end lows. Gray iron jobbing shops are not averaging more than four days a week.

A growing number of blast furnaces are returning to production. United States Steel Corp. relighted its No. 4 stack at the Edgar Thomson Works, Braddock, Pa., on Feb. 28; its No. 2 blast furnace at Clairton Steel Works, Clairton, Pa., on Mar. 5; its No. 5 blast furnace at Gary Steel Works & Furnaces, Gary, Ind., last week. The larger of the two stacks of Alan Wood Steel Co. at Swedeland, Pa., has resumed operations.

Iron Ore . . .

Iron Ore Prices, Page 157

The U. S. Steel Corp. has contracted with the Vale do Rio Doce Mining Co., Rio De Janeiro, Brazil, for 200,000 tons of iron ore this year at a price of $11.50 per ton. The $2,300,000 received by the Brazilian company will be used to buy eight oil drilling rigs from U. S. Steel for Petrobras, the Brazilian government oil corporation, it is reported.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 157

Demand for oven foundry coke is active, with March shipments to consumers outpacing the February movement. Further improvement in deliveries is anticipated in April, with foundry operations, though spotty, steadily showing improvement at various points.

Structural Shapes . . .

Structural Shape Prices, Page 142

Structural fabricators are anticipating an active building season. But, currently, inquiries are relatively small in size. Competition is noticeably keen. Eastern fabricators are highly competitive, with prices for steel in place subject to "shopping" pressure. In ten awards, (nearly 10,000 tons for the Massachusetts turnpike) almost as many shops shared in the tonnage. Sev-

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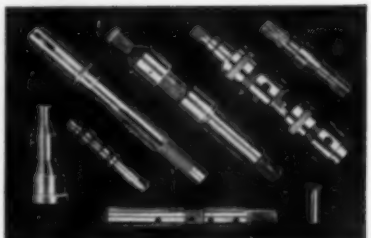

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eral normally fabricate little or no bridge steel. For general contracts, competition is equally sharp, with unit prices on steel usually under engineers' estimates.

This competitive situation is not reflected at the structural mills. They draw business from a wide area, and there is enough volume coming to them to support current price levels.

Prices Unchanged

FERROALLOY and pipe quotations, stainless, clad and tool steel prices remain unchanged. Current price schedules on these products were published in full on pp. 168 and 176 in the Mar. 7 issue of STEEL.

Increased export demand is an influence in this regard. Also, the fact that the shape mills are not getting sufficient semifinished to maintain capacity operations is a factor. Steelmakers with diversified products are directing more steel into the more profitable lines, sheets, for instance. This may be less true of the wide flange sections, with fabricators encountering supply trouble.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

3000 tons, tower steel, Bonneville Power Administration, to Bethlehem Pacific Coast Steel Corp., Seattle, at $794,054, low.

1100 tons, 17-story office building for Joseph P. Blitz Inc., 545 Madison Ave., New York, to Harris Structural Steel Co., that city.

900 tons, addition to Gorge dam, Skagit project, Seattle, to Columbia-Geneva Steel Division, U. S. Steel Corp., Provo, Utah; Merritt, Chapman & Scott Corp. and Savin Construction Corp., New York, joint contractors.

550 tons, two multipurpose hangars, Larson Air Field, Washington state, to unnamed fabricator; T. C. Bateson Construction Co., Dallas, Tex., general contractor, low at $845,510.

325 tons, junior high school, Springfield, Vt., to Vermont Structural Steel Co., Burlington, Vt.; Frechette & Clough, Tupper Lake, N. Y., general contractors.

145 tons, coal bunkers for Usibelli Coal Corp., Suntrana, Alaska, to Pacific Car & Foundry Co., Seattle.

100 tons, jail equipment, Kittitas county, Wash., to Southern Steel Co., San Antonio, Tex., $45,174; restrainer suit by competing bidder now in court.

STRUCTURAL STEEL PENDING

4000 tons, DeKalb Ave. subway reconstruction program, Board of Transportation, New York, inquiry withdrawn pending revision of plans.

1000 tons, addition to and reconstruction of Harlem Hospital, New York; bids closed Mar. 11.

500 tons, various Alaskan bridges; also piling; bids being taken by General Services, Seattle.

500 tons, dormitory and addition, Packer Hall, Lehigh University, Bethlehem, Pa.

300 tons, additional structures, Hanford Works; bids soon to the Atomic Energy Commission, Richland, Wash.

300 tons, maintenance shop building, Ladd Air Field, Alaska; Ladd & Ford, Bellingham, Wash., low at $379,262 to U. S. Engineer, Anchorage, Alaska.

200 tons, New York state bridgework, con-

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tract FARC 55-4, Suffolk county, New York, bids Mar. 31.

100 tons, including miscellaneous, two overspans, Flathead National Forest; bids to Bureau of Public Roads, Missoula, Mont., Mar. 25.

REINFORCING BARS . . .

REINFORCING BARS PLACED

750 tons, telephone building, Providence, R. I., Plantations Steel Co., Providence; E. Turgeon Construction Co., Providence, general contractor; Tower Iron Works, structural steel.

335 tons, geological-physics building, Bedford, Mass., to Joseph T. Ryerson & Son Inc., Cambridge, Mass.; Platt Construction Co., Cambridge, general contractor; 80 tons, fabricated structural steel to Hub Steel & Iron Works, Boston.

175 tons, housing project, Ft. Lewis, Wash., to Soule Steel Co., Seattle; J. W. Bateson Construction Co., Dallas, Tex., general contractor.

REINFORCING BARS PENDING

400 tons, sewage treatment plant, Ft. Lewis, Wash.; bids to U. S. Engineer, Seattle, Apr. 8.

200 tons, Washington state highway projects, Cowlitz, Clark and Thurston counties; general awards made Mar. 1.

130 tons, Flathead National Forest, Mont.; bids to Bureau of Public Roads, Missoula, Mont., Mar. 25.

114 tons, state girder overcrossing, King county, Washington; bids to Olympia, Wash., Mar. 22.

100 tons, central branch, National Bank of Commerce, Seattle; general contract to Haddock Engineers Ltd., Seattle, low at $719,973.

100 tons, addition to courthouse, Douglas county, Oreg.; general award to W. H. Shields Construction Co., Eugene, Oreg., low at $517,585.

PLATES . . .

PLATES PLACED

700 tons, wind tunnel and steel spheres for Boeing Airplane Co., Seattle, to Pittsburgh-Des Moines Steel Co., Seattle.

158 tons, storage tank, District No. 75, Seattle, to Pittsburgh-Des Moines Steel Co., Seattle.

100 tons, storage tank, Redmond, Oreg., to Chicago Bridge & Iron Co., Seattle, low at $25,580.

PLATES PENDING

300 tons, two water reservoirs, Puyallup, Wash.; Pittsburgh-Des Moines Steel Co., Seattle, is low.

PIPE . . .

CAST IRON PIPE PLACED

998 tons, 6, 8 and 12 in., to U. S. Pipe & Foundry Co., Seattle, by Portland, Oreg.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Burlington, thirty 1750-hp roadyard units, ten 2400-hp passenger units and ten 1200-hp switchers, to Electro-Motive Division, General Motors Corp., La Grange, Ill.

Canadian National, twelve 1600-hp diesel electric passenger locomotive units, to Montreal Locomotive Works, Montreal, Can.

Denver & Rio Grand Western, 18 diesel electric locomotives of different types, to Electro-Motive Division, General Motors Corp., La Grange, Ill.

RAILROAD CARS PLACED

Burlington, 1000 freight cars to own shops. List includes 350 fifty-ton box cars, 10 one-hundred-twenty-five-ton, 190 fifty-ton and 50 seventy-ton flat cars.

Gulf, Mobile & Ohio, 100 fifty-ton pulp wood cars to its Meridian, Miss., shops.

Illinois Central, 35 fifty-ton box cars, to its own shops.

RAILROAD CARS PENDING

New York Central, 200 covered hopper cement cars; bids asked.

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PANGBORN BLASTS
by don Harold

COST-CUTTING STORY OF THE PANGBORN BLAST CLEANING MACHINE

Pangborn Blast Cleaning Machine — available in six types, stationary or portable—delivers efficient, low cost maintenance in any plant. $1886 up.

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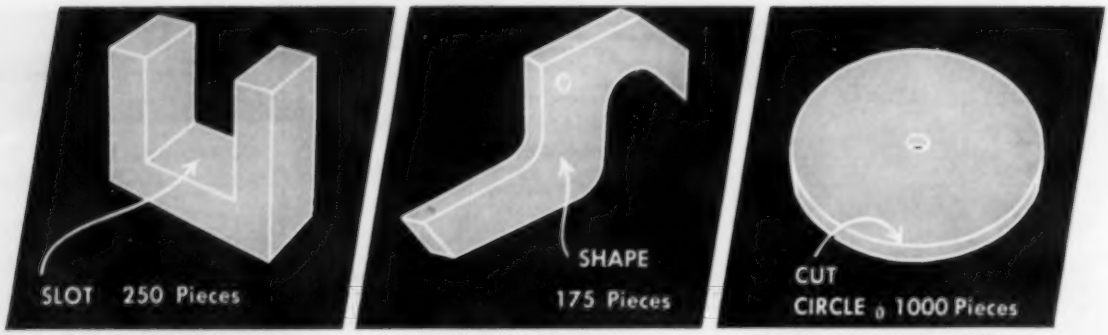
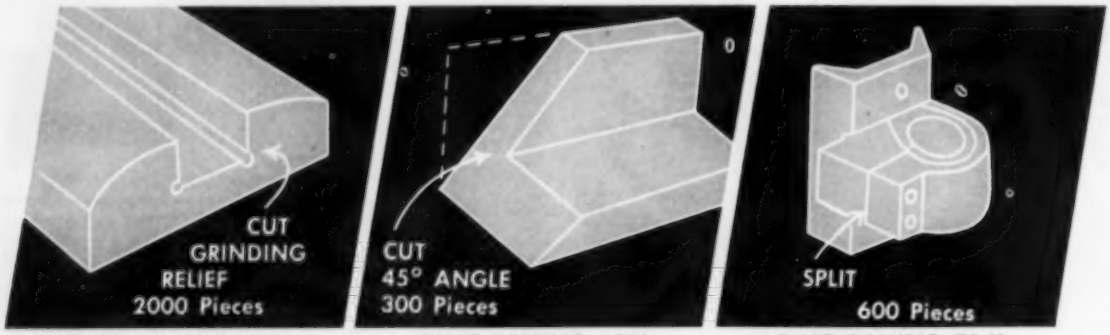


TIME SAVING 58% by replacing milling with band machining.

TIME SAVING 19% with band machining over torch cutting.

TIME SAVING 47% by changing from turning to band machining.



TIME SAVING 56% with band machining versus milling.

TIME SAVING 62% by changing from power hack saw to band machine.

TIME SAVING 71% with band machining over vertical milling.

To Cut Costs... Get the Facts about DoALL'S New Machining Concept

TO CUT your production machining costs simply analyze each operation to determine those that can be performed on new DoALL power-feed band machines. A DoALL man will help you—show you how to save up to 50% or more on jobs now being handled on slower, more costly machine tools.

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The "non-restricted geometry" of band machining—cut any angle, any direction, any radius—assures great versatility.

Add it up—faster cutting, lower tool cost, simple fixturing, lower capital investment, greater usefulness —then ask for a free demonstration. Call your local DoALL Store (see classified directory) or write *The DoALL Company, Des Plaines, Ill.*

DoALL

NEW COLOR FILM—"Production Band Machining" now available showing operation of this new machining concept.

PB-14

Call Your DoALL Service-Store
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DoALL GRANITE PLATES
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EDUCATIONAL STUDY WALL CHARTS

Economic Principles

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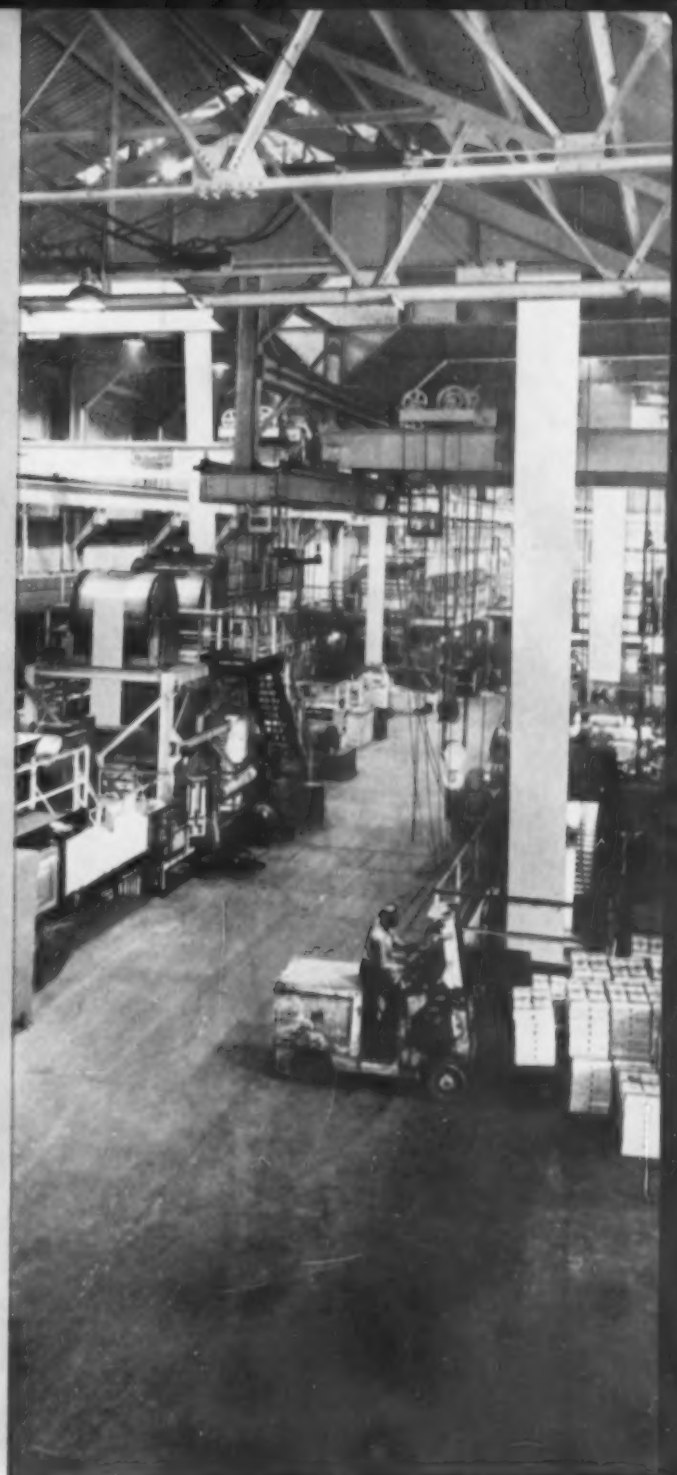

● **The 25th Aetna-built Continuous Galvanizing Line** could be yours. If you are considering a Continuous Galvanizing Line, you probably have ideas about the most practical process for your production. The lines offered by Aetna-Standard include all of the different processes and types in use today. This ability to combine specialized knowledge of Continuous Galvanizing with your own specific ideas is a principal reason for Aetna's building more lines than all other manufacturers. Add the most important requirement of all—performance of the equipment, plus integrity and ability to work with people, and you have some of the reasons why more companies select Aetna-Standard than any other manufacturer to build their Continuous Galvanizing Lines.

Will the 25th be yours?

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Aetna-Standard

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Demag Aktiengesellschaft, Duisburg, Germany — Germany, Austria, Yugoslavia, Greece, Turkey, Egypt.
Compagnia Italiana Forme Acciaio, Milano, Italy — Italy.
Aetna-Japan Company, Ltd., Tokyo, Japan — Japan.
Hale & Kellgren, Inc., Akron, Ohio — Representative for the Rubber Industry.

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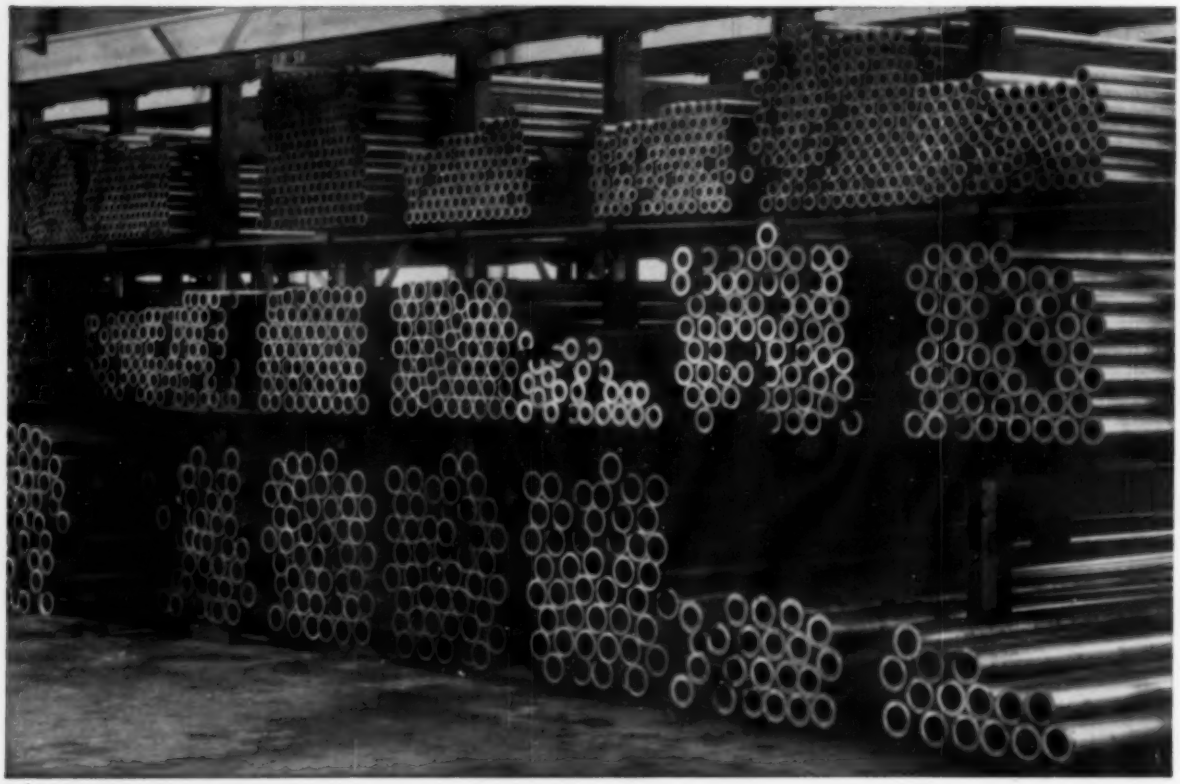

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52100 is a high-carbon chromium steel that will do most of your hollow parts jobs. In moderate sections it will through-harden and it has been used in place of more expensive steels. You can heat treat it to file hardness and then temper back to any desired point.

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